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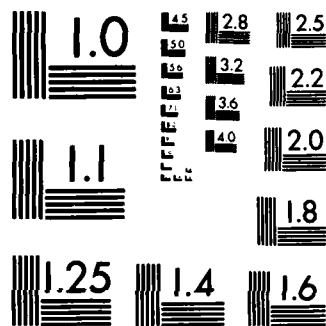
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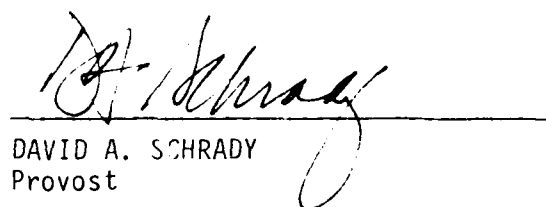
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4. TITLE (and Subtitle) COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES (1 OCT 81 - 30 SEP 82)		5. TYPE OF REPORT & PERIOD COVERED ABSTRACTS 1 October 1981 to 30 September 1982
7. AUTHOR(s) Naval Postgraduate School Monterey, CA 93940		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, CA 93940		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
13. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE April 1983
15. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 441
17. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		14. SECURITY CLASS. (of this report) UNCLASSIFIED
19. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Abstracts Theses Naval Postgraduate School		
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TABLE OF CONTENTS

<u>ADVANCED DEGREES</u>		<u>PAGE</u>
<u>DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING AND</u>		
<u>DOCTOR OF ENGINEERING</u>		1
Mandelberg, M.	Systematic Experimental Determination of Discrete- Time Models for Nonlinear Systems	3
Vatikiotis LT, USN	A Combustion and Heat Transfer Model for Porous Media	4
<u>DOCTOR OF PHILOSOPHY</u>		5
Barker, E. H.	A Comparison of Two Initialization Methods in Data Assimilation	6
Feit, A. LTCOL, Israeli Defense Forces	Dynamic Multicommodity Flow Schedules	8
Hugus, D. K. LTCOL, USA	Extension of Some Models for Positive-Valued Time Series	9
Klich, D. J. LCDR, USN	Efficient Multichannel Autoregressive Modeling in Time and Frequency Domain	10
Ze'evi, A. MAJ, Israel Air Force	Optical Scintillation on Folded Paths	11
<u>AERONAUTICAL ENGINEER</u>		13
Cramer, R. G., Jr. CPT, USA	Particle Size Determination in Small Solid Propellant Rocket Motors Using the Diffractively Scattered Light Method	15
Ferguson, J. A., III LT, USN	Finite Element Program for Calcula- ting Flows in Turbomachines with Results for NASA Task-1 Compressor	16

Hansen, B. J. LT, USN	Automatic Control and Data Acquisition System for Combustion Laboratory Applications	17
O'Neill, G. S. LT, USN	Asymmetric Reinforcements of a Quasi- Isotropic Graphite Epoxy Plate Containing a Circular Hole	18
Wroblewski, J. J., Jr. LT, USN	The Lateral Response of an Airship to Turbulence	19
<u>ELECTRICAL ENGINEER</u>		21
Huston, N. E., Jr. LCDR, USN	Shift and Scale Invariant Preprocessor	23
<u>MECHANICAL ENGINEER</u>		25
Bender, G. L. LT, USN	Optimization of Three Dimensional Combined Truss/Frame Structures	27
Hilder, D. S. LT, USN	Entrainment Modelling of Buoyant Momentum Jets in Water	28
Hundley, R. LT, USN	A Version of the Graphics-Oriented Interactive Finite Element Time- Sharing System (GIFTS) for an IBM With CP/CMS	29

MASTER OF SCIENCE DEGREES

<u>AERONAUTICAL ENGINEERING</u>		31
Bramer, J. R. LCDR, USN	An Investigation of the Effectiveness of Smoke Suppressant Fuel Additives for Turbojet Applications	33
Burd, J. E. LT, USN	Flow Control For a High Energy Laser Turret Using Trapped Vortices Stabilized by Suction	34
Cramer, R. G., Jr. CPT, USA	See title listed under Aeronautical Engineer	
Fardink, P. J. MAJ, USA	Hand-Held Computer Programs for Preliminary Helicopter Design	35
Ferguson, J. A., III LT, USN	See title listed under Aeronautical Engineer	

Ferrell, D. R. LCDR, USN	A Review and Analysis of Aircraft Vulnerability	36
Hansen, B. J. LT, USN	See title listed under Aeronautical Engineer	
Herman, R. J. LCDR, USN	Postbuckling Behavior of Graphite/ Epoxy Cloth Shear Panels With 45°- Flanged Lightning Holes	37
Lee, J. MAJ, Republic of Korea Air Force	Effects of Wind on the Aircraft Optimum Cruise Performance and Flight Perfor- mance Advisory Systems for F-4E and F-5E Aircraft	38
McClellan, T. R. LT, USN	Experimental Investigation of Thrust Augmenting Ejectors Using Vane Excited Primary Jets	39
Mentas, J. W. LT, USN	A Simulator Evaluation of Pilot Response to Low Frequency Aircraft Vibration with Audio Feedback	40
Molloy, W. D., Jr. LCDR, USN	Preliminary Measurements and Code Calculations of Flow Through a Cascade of DCA Blading at a Solidity of 1.67	41
Neboshynsky, W. LT, USN	Field Inspection Techniques for Buried Steam Distribution Lines	42
O'Neill, G. S. LT, USN	See title listed under Aeronautical Engineer	
O'Neill, H. J. MAJ, USMC	Calculation of the Logitudinal Stability Derivatives and Modes of Motion for Helicopter Aircraft	43
Rippel, D. A. LCDR, USN	Airborne Laser Turret Flow Control: A Parametric Study of Wind Tunnel Model Conditions	44
Stichter, M. C. LT, USN	Evaluation of Helicopter Pilot's Attitude Control Using a Simulated Head-up Display in a Simulated Helicopter Cockpit	45
Thornburg, D. W. LT, USN	An Investigation of Engine and Test Cell Operating Conditions on the Effectiveness of Smoke Suppressant Fuel Additives	46

Voulgarakis, G. G. LT, Hellenic Navy	See title listed under Electrical Engineer	
Wrobleski, J. J., Jr. LT, USN	See title listed under Aeronautical Engineer	
<u>APPLIED MATHEMATICS</u>		47
Hogg, D. L. CAPT, USMC	An Algebraic Structure for the Convolution of Life Distributions	49
Linhart, R. J., Jr. CAPT, USMC	A Study of Foutz's Multivariate Goodness-of-Fit Test	50
<u>COMPUTER SCIENCE</u>		51
Al-Lahaidan, F. A. LT, Royal Saudi Naval Forces	Maintaining the Integrity of Distri- buted Database	53
Borcheller, O. D. CPT, USA	Functional Pascal: An Interim Solution to a Changing Course in Programming Language Development	54
Bresani, E. E. LT, Peruvian Navy	Distributed Database Management System Recovery From Network Partitioning	55
Clair, W. C. LCDR, USN	Adaptation of a Knowledge-Based Decision-Support System in the Tactical Environment	56
Comi, P. M. LT, USN	Implementation of the VGM Graphics System on the PDP 11/50 Under the RSX-11M Operating System and Construc- tion of Compatible Software Driver for the Ramtek RM-9400	57
Danhof, R. F. CPT, USA	See title listed under Clair, W. C.	
Futaci, S. LT(jg), Turkish Navy	Representation Techniques for Relational Languages and the Worst Case Asymptotical Time Complexity Behavior of the Related Algorithms	58
Gehl, M. T. LCDR, USN	Deadlock Detection in Distributed Computing Systems	59
Hicklin, M. S. CAPT, USMC	Adaptation of Magnetic Bubble Memory in a Standard Microcomputer Environment	60

Jones, P. L. CAPT, USMC	Design and Implementation of a Personal Database Management System	61
Klinefelter, S. G. CPT, USA	Implementation of a Real-Time, Distributed Operating System for a Multiple Computer System	62
Kolesar, G. F. MAJ, USA	A Decision Support System for U.S. Army Unit Status Reporting	63
Koutsotolis, A. CDR, Hellenic Navy	Investigation of the ADA Language Implementation of the Hellenic Command Control and Information System	64
Lazo, W. M. LT, Peruvian Navy	Performance Analysis of Computer Installations Virtual Machine/370 (VM/370)	65
Mastrocostopoulos, I. T. MAJ, Hellenic Army	Specifications of a Simulation Model for a Local Area Network Design in Support of Stock Point Logistics Integrated Communications Environment (SPLICE)	66
McElyea, W. P. MAJ, USMC	Optimistic Concurrency Control for Distributed Databases	67
Moedjiono CAPT, Indonesian Navy	The Preliminary Personnel Data Base Design for the Indonesian Navy	68
Neufeld, J. A. CAPT, USMC	See title listed under Hicklin, M. S.	
Powley, C. N. LCDR, USN	Development of a Concurrent Tree Search Program	69
Relue, R. LCDR, USN	Comparison of Microprocessor Based Data Base Management Systems	70
Ross, R. S. CPT, USA	See title listed under Borcheller, O. D.	
Vassiliou, S. CDR, Hellenic Navy	A Distributed Network Supporting Ocean Surveillance	71
<u>ELECTRICAL ENGINEERING</u>		73
Hanratty, J. M. CPT, USA	Measured Performance of a Delay Lock Tracking Loop When Noise Power Exceeds Signal Power	75

Heritsch, R. MAJ, USA	A Distributed Routing Protocol for a Packet Radio Network	76
Huston, N. E. Jr. LCDR, USN	See title listed under Electrical Engineer	
Ibert, P. J. LCDR, USN	Application of Computer Modeling to the Study of the Thermodynamic Forces Acting on a Building	77
Isik, M. LT, (jg), Turkish Navy	An Application of Kalman Filtering and Smoothing to Torpedo Tracking	78
Maughan, A. M. MAJ, USA	Design and Operation of a Simple Circuit Useful as a Modulator to Generate Arbitrary Composite ASK and PSK Carriers	79
Voulgarakis, G. G. LT, Hellenic Navy	Missile Misdistance Reduction: An Instructive Methodology for Developing Terminal Guidance Control Systems to Minimize Missile Misdistance	80
<u>ENGINEERING ACOUSTICS</u>		81
Gagliardi, J. J. LT, USN	Measurements of the Horizontal Direc- tionality of the Ambient Acoustic Noise in Monterey Bay, California	83
van Dord, D. LCDR, Royal Netherlands Navy	Two-Phase Laminar Boundary Layer Flow Around a Wedge	84
<u>ENGINEERING SCIENCE</u>		85
Ames, M. P., Jr. LT, USN	Low Frequency Geomagnetic Fluctuations (0.025 to 20 Hz) on the Floor of Monterey Bay	87
Carr, H. M., III CPT, USA	Aerodynamically Efficient Gradient Refractive Index Missile Seeker Lens	88
Gillespie, T. R. LCDR, USN	Holographic Investigation of Solid Propellant Particulates	89
Johns, E. R. LT, USN	Creation of a Transportable Interaction User Interface for Improved AAA Simulation Computer Program (P001)	90
Murphy, D. F. CDR, USCG	A Laboratory Evaluation of the Suitability of a Xenon Flashtube Signal as an Aid-to-Navigation	91

Natale, J. J. LT, USN	16-Inch Gun-Launched Anti-Satellite Weapon	92
Penix, L. E. LCDR, USN	Flow Control About an Airborne Laser Turret	93
Potter, G. G. LCDR, USN	A Sensitivity Analysis of the Kalman Filter as Applied to an Inertial Navigation System	94
Pouliezios, D. P. LT, Greek Navy	Dynamic Stability of Flight Vehicles	95
Soyalp, F. LT (jg), Turkish Navy	A Study of the Effect of Processing Variables on the Mechanical Proper- ties of 5-Inch Cartridge Cases	96
Vehslage, L. M. LT, USN	See title listed under Ames, M. P.	
<u>INFORMATION SYSTEMS</u>		97
Aday, D. R. CAPT, USMC	Automated Data Processing Equipment for the Fleet Marine Force (ADPE-FMF)	99
Arana, R. LT, Peruvian Navy	See title listed under Reinhart, J. N.	
Artzer, S. P. LT, USN	Software Engineering Basics: A Primer for the Project Manager	100
Beauchamp, B. R. CAPT, USMC	ADPE Maintenance Contracts in the Marine Corps	101
Bresani, E. E. LT, Peruvian Navy	See title listed under Computer Science	
Devescovi, D. J. LCDR, Civil Engineer Corps, USN	Feature Analysis of Computer Aided Design	102
Gamboa, L. L. LT, USN	See title listed under Walizer, D. E.	
Gerhard, J. C., III LCDR, USN	Requirements Analysis for Effective Management Information Systems Design: A Framework and Case Study	103
Green, J. F. LCDR, USN	Dynamic Planning and Control of Software Maintenance a Fiscal Approach	104

Hackert, N. J. MAJ, USMC	Automated Data Processing/Simulation Requirements of the Marine Corps Tactical Systems Support Activity	105
Hayes, J. R. LCDR, USN	A Computer Aided Instruction Tutorial for the Ramtek 9400 Color Graphics Display System at the Naval Post- graduate School Monterey, California	106
Hodgson, R. A. CPT, USA	See title listed under Tody, S. C.	
Inman, K. A., Jr. CAPT, USMC	Supply Point Logistics Integrated Communications Environment (SPLICE) Local Area Computer Network Design Issues for Communications	107
Langley, F. M. LT, USN	See title listed under Norton, C. P.	
Larson, J. D. MAJ, USMC	The Use of the Marine Corps Standard Accounting, Budgeting and Reporting System to Meet Data Requirements of the Commercial Activities Program	108
Marmanillo, L. W. LT, Peruvian Navy	See title listed under Computer Science	
Marthouse, R. C., Jr. LT, Medical Service Corps, USN	See title listed under Inman, K. A.	
Merring, W. H., III CPT, USMC	A Model for Estimating Tactical Software Maintenance Requirements	109
Neidrauer, R. A. LT, USN	See title listed under Artzer, S. P.	
Norton, C. P. LT, USN	Feasibility and Requirements Analysis of MIS for Operational Patrol Squadrons in the United States Navy	110
Pierce, M. L. Jr. CAPT, USMC	See title listed under Aday, D. R.	
Reinhart, J. N., III LT, USMC	Database and Terminal Management Functional Design Specifications in Support of Stock Point Logistics Integrated Communication Environment (SPLICE)	111

Rodenbarger, S. W. LCDR, Supply Corps, USN	A Functional Comparison of the Naval Aviation Logistics Command Management Information System (NALCOMIS) and the Shipboard Uniform Automated Data Processing System-Real Time (SUADPS-RT)	112
Rowley, D. J. LCDR, USN	United States Navy Helicopters in Combat Search and Rescue	113
Selby, B. F. LT, USN	See title listed under Green, J. F.	
Tody, S. L. LCDR, USN	Projection of Maximum Software Maintenance Manning Levels	114
Sherrard, J. C. LCDR, USN	See title listed under Hayes, J. R.	
Vorgang, B. R. CAPT, USMC	A Macro Approach to Software Resource Estimation and Life Cycle Control	115
Walizer, D. E. LT, USN	A Handbook for Automatic Data Processing Equipment Acquisition	116
<u>MANAGEMENT</u>		117
Ackley, V. H. LCDR, USN	See title listed under Maillefert, C. W.	
Adams, A. E. CPT, USA	A Comparison and Analysis of Army Generals and Executives	119
Allion, D. G. LCDR, Supply Corps, USN	An Analysis of Local Delivery Costs and Times at Naval Supply Center Oakland, California	120
Biliouris, J. L. LT, USN	See title listed under Cole, A. L.	
Blackwood, R. E. CPT, USA	Feasibility of Gathering Depreciation Information From Existing Sources for US Army Installation Accrual Accounting Systems	121
Boyer, M. W. CPT, USA	See title listed under Adams, A. E.	
Bozin, W. G. LCDR, USN	Improving the Management Control of Aviation Fleet Maintenance Funds	122

Breen, M. F. LT, USCG	A Full Overhead Cost Model for the U. S. Coast Guard Yard, Curtis Bay, Maryland	123
Bush, J. R. LT, USN	Aviation Squadron Organization Development of the Navy's Light Airborne Multi-Purpose System (LAMPS) Mk III	124
Buttolph, L. W. LCDR, USN	Energy Forecasting Models Within the Department of the Navy	125
Cain, R. L. LT, Medical Service Corps, USN	Socioeconomic and Personal Variables Effecting Retention of Medical Officers	126
Choe, K. S. LTCOL, Republic of Korea Air Force	A Study of Comparative Management Styles in Japan and Korea	127
Clark, M. J. CPT, USA	Analysis of the Criminal Jury Trial Scheduling System in Use at the Monterey Branch of the Monterey County, California, Municipal Court	128
Clements, M. R. LT, USN	Qualified Aircraft Handlers: A Study of the Utilization and Placement of Trained Personnel in Naval Aviation Units	129
Cole, A. L. CDR, USN	An Analysis of Contracting Officer Technical Representative Training Requirements	130
Coward, T. W. LCDR, USN	Training Requirements Determination	131
Coyle, T. A. LCDR, USN	An Examination of the Effort to Automate the Procurement System of the Navy Field Contracting System	132
Dickens, G. R. CPT, Australian Regular Army	Manning the Nuclear Submarine Force of the 1980's and Beyond: An Officer Study	133
Doong, L. K. C. LT, USN	A Manpower Model to Determine Future Inputs to NEC 335X Billets and NEC 336X Billets	134

Downs, J. L., II LCDR, USN	An Apple II Implementation of the Man-Mod Manpower Planning Model	135
Doyle, M. E., III LCDR, USN	An Analysis for Capital Expenditure Decisions at a Naval Regional Medical Center	136
Dulude, E. P. LCDR, Medical Service Corps, USN	An Organization Development Approach to Technology Transfer in the National Forest Service	137
Dyer, J. W. LCDR, USN	An Analysis of Cost Growth in the F/A- 18 Airplane Acquisition Program	138
Dyer, M. F. G.	An Analysis of the Acquisition Process at the End of the Fiscal Year	139
Dykes, J. M. LCDR, Supply Corps, USN	Internal Auditing Techniques Utilized at the County and Municipal Level of Government in the State of California	140
Eberling, G. D. LCDR, Supply Corps, USN	Submarine Tender Shipboard Uniform Automated Data Processing System Requisition/Issue/Receipt Document Processing Errors, Omissions and Procedural Deviations	141
Eller, J. M. LCDR, Supply Corps, USN	An Analysis of Material Distribution From NSC San Diego to Local Customers	142
Engel, J. D.	Merit Pay as a Motivation in the Federal Sector	143
Evensen, D. A. LT, USN	Ship's Force Overhaul Management System: An Evaluation of Its Effects on Shipboard Authority	144
Feller, R. H. MAJ, G. S., Swiss Army	Executive Jobs and Executive Continuity: "An Investigation With Special Reference to Swiss Army Instructors"	145
Fleumer, A. M. CPT, USA	Performance Evaluation Methods for Army Finance and Accounting Offices	146
Flood, J. L. LCDR, USN	A Comparison of Manning Options for the AO-177 Class Fleet Oiler	147

Gettys M. M. CPT, Adjutant General's Corps, USA	Organizational Effectiveness: A Comparative Analysis Between Army and Navy Officers	148
Gil Rojas, J. G. CDR, Venezuelan Navy	An Approach to the Application of Life Cycle Cost Concept in Weapon Systems Acquisition for the Venezuelan Navy	149
Goren, R. COL, Israeli Air Force	Multi-Attribute Utility Theory to Assist Top Level Acquisition Decision- Making	150
Goward, D. A. LT, USCG	Career Orientations of Coast Guard Aviators	151
Goza, J. L. MAJ, USMC	The AV-8B Decision	152
Gregor, C. J. MAJ, USMC	Career Development of the Marine Corps Officer	153
Griswold, M. J. CPT, USA	An Organizational Behavior View of Department of the Army (DA) Comptrollership	154
Hardcastle-Taylor, M. LCDR, USN	See title listed under Parham, J. L.	
Harrington, J. H., Jr. LT, USN	Software Quality Assurance and the Fleet Material Support Environment	155
Herndon, E. L., Jr. LT, Civil Engineer Corps, USN	Cost Estimation of Architect & Engineer Contracts	156
Hickman, D. G. LT, Civil Engineer Corps, USN	Management Advisory Services by CPA's; A Survey of Current Expansion of Sole Proprietor Professional Practice Units	157
Hicks, T. H. MAJ, USMC	Impact of VHSIC Technology on Battle Zone Material Management	158
Hiza, G. W. LT, Supply Corps, USN	Trident Submarine Logistics Data System (LDS): A Case Study in Life Cycle Management and Budgeting	159
Hunt, J. M., Jr. CPT, USA	Intergenerational Occupational Inheri- tance in the Department of Defense	160

Infield, J. J. LT, USN	An Investigation of the Feasibility of Manning the Airwings of the Projected FY 1990 Carrier Force	161
Jaehne, G. R. CPT, USA	A Battalion/Division Fiscal Control System Training Resource Management	162
Johnston, K. A. CDR, Civil Engineer Corps, USN	An Investigation of the Local Management Summary Code as an Assist to Public Works Maintenance Management	163
Jones, J. M. CDR, USN	Evolution of the Shipbuilding Escala- tion Clause	164
Kamin, D. Y. LCDR, USN	A Look at Today's Enlisted Woman in the Navy	165
Kehoe, K. J. CPT, USA	See title listed under Griswold, M. J.	
Kenehan, D. J. CPT, USA	A Manpower Training Requirements Model for New Weapons Systems, With Applica- tions to the Infantry Fighting Vehicle	166
Kloster, M. G. CPT, Military Intelligence, USA	The Implementation of the Counterintel- ligence Assistant Program	167
Knight, C. L. LT, USN	Untimely Payment of Small Purchase Invoices	168
Kreutner, S. M. LT, USN	Social, Economic and Behavioral Differences Among Enlisted Personnel Based on Age at Service Entry	169
LaFleur, T. W. LCDR, USN	An Internal Review Model for the Naval Military Personnel Command	170
La Grave Marin, K. J. CDR, Venezuelan Navy	Assessment of the Potential for Human Resource Accounting in Venezuelan Navy Management Decision Making	171
Leon Lara, J. M. CPT, Venezuelan Navy	Naval Ships Acquisition Strategy for the Venezuelan Navy	172
Law, R. V. LCDR, Supply Corps, USN	Managing Growth and New Work in Con- tracts for the Repair and Overhaul of U.S. Naval Vessels in Private Shipyards	173

Lepick, M. H. LCDR, USN	Toward a Fifteen Battlegroup Navy: A Supply Side View and Implications for Force Composition and Personnel Quality	174
Little, T. J. LT, Medical Service Corps, USN	The Uniform Chart of Accounts and its Use in Management Control	175
Loessin, M. M. LCDR, USN	See title listed under Dulude, E. P.	
Maillefert, C. W. CDR, USN	U.S. Port Development and the Expanding World Coal Trade: A Study of Alternatives	176
Marashian, C. D. CPT, USA	A Study of Human Factors That Affect Combat Effectiveness on the Battlefield	177
Maxwell, A. G., Jr. CPT, Signal Corps, USA	See title listed under Gettys, M. M.	
McComb, S. R. LTCOL, USMC	Funding Depot Level Repairables in the Navy Stock Fund: The Effect on M.C.A.S. Iwakuni, Japan	178
Merlo, C.	The Research, Development, Test and Evaluation Incremental Programming Policy at Department of Defense In- House RDT&E Activities	179
Minges, W. T., III LT, USN	See title listed under Worley, M. J.	
Moore, R. T., III LCDR, Supply Corps, USN	See title listed under Eller, J. M.	
Morgan, R. A. LT, USN	An Analysis of Instructional Television for Naval Aviation Inservice Maintenance Training	180
Nelms, L. W. LCDR, USN	A Simulation Model Depicting Fleet Expansion Effects on the Fire Control Technicians Training Pipelines	181
Nielsen, V. D. MAJ, Royal Danish Air Force	Application of Life Support Cost, Provisioning, and Repair/Discard Models to Weapon System Procurement Decisions by Small Countries	182

O'Connor, J. J. LT, USCG	See title listed under Perry, J. C.	
Opsal, P. B. LT, USN	See title listed under Coward, T. W.	
O'Reilly, P. J. LCDR, USN	An Evaluation of Allowance Determina- tion Using Operational Availability	183
Paine, W. J. LT, USN	A Statistical Evaluation of Military Construction Project Cost Estimates	184
Parham, J. L. LCDR, Supply Corps, USN	O&MN Budget Execution at U.S. Naval Shore Activities: A Model for Improving Resource Allocation	185
Perry, J. C. LCDR, USCG	An Analysis of the Effects of the Proposed Coast Guard Used Fee on the Oceangoing U.S. Merchant Marine	186
Pillifant, C. B. CAPT, USMC	Implementing Material Requirements Planning in the MCLB Barstow Depot Maintenance Activity	187
Pipho, J. R. CAPT, USMC	Depreciation Requirements in the Department of Defense	188
Proctor, L. L. LCDR, Supply Corps, USN	An Analysis of the United States Maritime Industry Subsidy Program and National Defense: A Rational Approach to Sealift Readiness	189
Reed, R. P. LCDR, Supply Corps, USN	Long Range Logistics Planning for VHSIC (Very high Speed Integrated Circuit) Components	190
Rupp, G. L. LT, Medical Service Corps, USN	United States Navy Fleet Hospital Support: Evolution, Organization, and Development	191
Selfe, J. K. MAJ, Transportation Corps, USA	See title listed under Rupp, G. L.	
Udelman, A. S. CDR, Venezuelan Navy	Organization Development: An Approach for Achieving Desired Organizational Goals Within the Venezuelan Navy	192
Shahal, H. LCDR, Israel Navy	See title listed under Nielsen, V. D.	

Slaybaugh, E. R. LCDR, USN	A Preliminary Analysis of TF34-100/ 400 Jet Engine Rework Data in Support of the MRP System Implementation at NARF Alameda	193
Slone, H., Jr. CPT, USA	Manning the Army in 1990	194
Smith, J. T. LCDR, USN	See title listed under Nelms, L. W.	
Smith, P. G. LT, USN	Snap II: Shipboard Microcomputer Applications in Personnel, Adminis- tration, and Training - A User's Perspective	195
Smith, R. W. LCDR, USN	DCASPRO Use of the "Basket Method"	196
Sonntag, S. J. LCDR, USN	Analysis of Field Activity Perspec- tives of Centralized Non-Appropriated Fund Accounting, Banking, and Payroll Procedures Within the Department of the Navy	197
Sooy, G. K. LT, USCG	Coast Guard Compensation Alternatives	198
Strawn, G. W. LCDR, USN	Material Requirements Planning and Logistic Support for a Field Service Organization: A "Real World" Example	199
Sutherland, P. K. LCDR, USN	See title listed under Kamin, D. Y.	
Taylor, J. P. LT, Medical Service CORPS, USN	See title listed under Little, T. J.	
Thomas, R. L. LT, USN	See title listed under Coward, T. W.	
Tongsima, S. LT(jg), Royal Thai Navy	Foreign Military Sales Between Thailand and U. S.	200
Tufts, J. E. LCDR, Supply Corps, USN	See title listed under Allion, D. G.	
Urrutia, M. B. CPT, USA	See title listed under Fleumer, A. M.	

Van Doren, W. R. LT, USN	Demand and Supply of High Quality Sailors	201
Vivas, J. B. LCDR, Venezuelan Marine Corps	Prospective Model and its Methodology of Supplies for the Repair and Maintenance of the Venezuelan Naval Ships to the Third Level	202
Wendt, R. A. LCDR, USCG	Civil Penalty Effectiveness in the United States Coast Guard	203
Worley, M. J. LCDR, USN	Cost Effectiveness Analysis of Home- porting an Aircraft Carrier in the Mediterranean Sea	204
Worrall, E. H. LCDR, USN	Industry Perceptions of the Cost/ Schedule Control Systems Criteria (C/SCSC)	205
Yarosh, C. D. LT, USN	See title listed under Lepick, M. H.	
<u>MECHANICAL ENGINEERING</u>		207
Barton, S. A. LT, USN	A Study of the Effect of Interrupted Quenches on a Thermomechanically Processed High Carbon Steel	209
Bender, G. L. LT, USN	See title listed under Mechanical Engineer	
Brunson, F. W., Jr. LT, USN	Local Heat Transfer Coefficients Around a Cylinder in Oscillating Flow	210
Bry, W. A. LT, USN	Aerodynamic Loads on a Ball-Obtured Tubular Projectile	211
Cooper, T. C. LCDR, USN	Theoretical Modeling of Fluid Interac- tions Produced by Ship Bow Thrusters	212
Drucker, C. J. LT, USN	Characteristics of a Four-Nozzle, Slotted Short Mixing Stack with Shroud, Gas Eductor System	213
Eick, I. J. LCDR, USN	Testing of a Shrouded, Short Mixing Stack Gas Eductor Model Using High Temperature Primary Flow	214

Elger, W. M. LT, USN	Characterization of an HY-130 Steel Weldment by Transmission Electron Microscopy	215
Everett, H. R.. LCDR, USN	A Microprocessor Controlled Autonomous Sentry Robot	216
Felix, J. E. LT, Ecuadorian Navy	Shape Optimization of Trusses Subject to Strength, Displacement, and Frequency Constraints	217
Fitzgerald, J. E., III LT, USN	Development of a Computer Program for the Testing and Evaluation of Numerical Optimization Techniques	218
Hilder, D. S. LT, USN	See title listed under Mechanical Engineer	
Hopper, J. H., III LCDR, USN	Probabilistic Design Using Numerical Optimization	219
Hundley, R. LT, USN	See title listed under Mechanical Engineer	
Hunn, J. M. LT, USN	Investigation of a Loose-Webbed Paddle Surface Impulse Propulsor	220
Jenkins, J. L. LT, USN	Application of Optimization Techniques to Naval Surface Combatant Ship Synthesis	221
Johnson, M. D. LT, USN	Liquid Crystal Mapping of Jet Cross- flow Interactions	222
Krohn, R. L. LCDR, USN	An Experimental Apparatus to Study Enhanced Condensation Heat Transfer of Steam on Horizontal Tubes	223
Mason, B. J. LT, USN	Use of Implant Testing to Evaluate the Susceptibility of HY-130 Steel Weldments to Hydrogen Embrittlement	224
McGowen, T. L. LT, USN	Type 1 Hot Corrosion Furnace Testing and Evaluation	225
Miller, M. R., Jr. LCDR, USCG	Synthesis of a Collision Tolerant Fixed Navigation Marker System	226
Muesing, W. E. LT, USN	Thermal Martensitic Transformation Cycling in Cu-Zn-Al Shape Memory Alloys	227

Mulholland, D. J. LT, USN	An Investigation of the Feasibility of of Implementing Substantial Finite Element Codes on Popular Microcomputers	228
Noftz, P. J. LT, USN	Effects of Condensate Inundation and Vapor Velocity on Heat Transfer in a Condenser Tube Bundle	229
Nollie, T. C., Jr. LT, USN	Dual-Phase Nozzle Flow	230
Paquette, J. L. LT, USN	An Interactive Computer Program for the Preliminary Design and Analysis of Marine Reduction Gears	231
Pellin, A. F., III LT, USN	An Experimental Technique for the Study of Velocity Profiles in a Growing Droplet Using A Pulsed Nitrogen Laser	232
Roberts, W. L. LCDR, USN	Integration of Finite Element Analysis Program for Conduction Heat Transfer With Computer Analysis Language	233
Shirah, R. H. LCDR, USN	The Influence of Solution Treatment Time and Quench Rate on Microstruc- ture and Mechanical Properties of High-Magnesium Aluminum-Magnesium Alloys	234
Stowell, T. L. LT, USN	Friction Measurement by means of a Gyroscopic Mass	235
Sponholz, R. O. LCDR, USN	An Investigation into the Two-Way Shape Memory Trainability of Poly- Crystalline Cu-Zn-Al Alloys	236
Trytten, D. O. LCDR, USN	Oscillating Flow About Yawed Cylin- Cylinders	237
Wilson, M. B. LT, USCG	A Simple Interactive Program to Design Supercavitating Propeller Blades	238
<u>METEOROLOGY</u>		239
Conant, P. R. CAPT, USAF	A Study of East-Coast Cyclogenesis Employing Quasi-Lagrangian Diagnostics	241

Rinard, S. K. National Weather Service	An Analysis of a Puff Dispersion Model for a Coastal Region	242
Shaffer, A. R. CAPT, USAF	Typhoon Motion Forecasting Using Empirical Orthogonal Function Analysis of the Synoptic Forcing	243
Tallman, W. C. CAPT, USAF	Application of Quasi-Lagrangian Diagnostics to the Study of Numeri- cally-Simulated Oceanic Cyclones	244
Tucker, W. B. U.S. Army Cold Regions Research and Engineering Laboratory	An Application of a Numerical Sea Ice Model to the East Greenland Area	245
<u>METEOROLOGY AND OCEANOGRAPHY</u>		247
Allen, R. L., Jr. LT, USN	The Impact of Tectonic Activity in the Development of Monterey Submarine Canyon	249
Burger, R. J. LT, USN	Oceanic Mixed Layer Response to Tidal Period Internal Wave Motion	250
Butler, W. A. LCDR, USN	A Study of Horizontal Sea Surface Temperature Variability	251
Fauquet, R. L. LCDR, USN	A Synoptic/Statistical Analysis of Summer Season Circulation Patterns Over Eastern Antarctica During Moist Air Intrusions	252
Gleason, J. P. LT, USN	Single-Station Assessments of the Synoptic-Scale Forcing on the Marine Atmospheric Boundary Layer	253
Hopkins, C. K. LT, USN	Ocean Response to Hurricane Forcing	254
Larsen, D. G. LT, USN	Oceanic Data Assimilation Tests with a One-Dimensional Model	255
Perdue, W. F. LT, USN	Oceanographic Investigation of the East Greenland Polar Front in Autumn	256
Scarbro, K. M. LCDR, USN	Analysis of Antarctic Remote-Site Automatic Weather Station Data for Period January 1979 - February 1980	257

Steiner, E. F. LT, USN	One-Dimensional Model Predictions of Upper Ocean Temperature Changes Between San Francisco and Hawaii	258
<u>OCEANOGRAPHY</u>		259
Cowen, M. B. LT, Canadian Armed Forces	Overwintering Strategies of the Calanoid Copepod <u>Calanus Plumchrus</u> In a Periodically Anoxic British Columbia Fjord	261
Silva, F. C. LCDR, Portuguese Navy	Calculation of Hydrographic Position Data by Least Square Adjustment	262
Silva, V. M. F. P. LT, Portuguese Navy	Thermal Calibration of Satellite Infrared Images and Correlation with Sea-Surface Nutrient Distribution	263
Wheaton, G. E. LT, NOAA	Application of Additional Secondary Factors to Loran-C Positions for Hydrographic Operations	264
<u>OPERATIONS RESEARCH</u>		265
Bausch, D. O. CAPT, USMC	Computational Advances in the Solution of Large-Scale Set Covering and Set Partitioning Problems	267
Bucha, P. J. CPT, USA	A High Resolution Ammunition Resupply Model	268
Camozu, E. LT(jg), Turkish Navy	A Study of the Application of the Lognormal and Gamma Distributions to Corrective Maintenance Repair Time Data	269
Cha, J. S. MAJ, Korean Army	An Assessment of the Role of Coal in the Long-Term Energy Plan for Korea	270
Cora, D. LT, Turkish Navy	Estimating Survival Probability or Reliability: Simulation Assess- ments of the Delta Method, Jackknife, and Bootstrap	271
Davison, R. J. LCDR, USCG	Graphics Simulation of the Poisson Process	272
Devereux, F. A. LT, USN	Seatag Extension	273

Finley, M. E. LCDR, Supply Corps, USN	An Extended Microcomputer-Based Network Optimization Package	274
Fisher, M. A. LT, USCG	The Impact of Motion and Motion Sickness on Human Performance Aboard Monohull Vessels and Surface Effect Ships: A Comparative Study	275
Fox, W. P. CPT, USA	A System Analysis of the Counterforce Potentials Model	276
Furman, J. S. CPT, USA	A Methodology for the Evaluation of Unit Tactical Proficiency at the National Training Center	277
Guion, S. W. LCDR, USN	Multivariate Analysis of Afloat Supply Performance and Aircraft Readiness Data	278
Gursel, S. LT, Turkish Navy	Some Computer Algorithms to Implement a Reliability Shorthand	279
Haffey, W. J. CAPT, USMC	An Application of Discriminant Analysis to the Construction of a Performance Index for Marine Officers	280
Hartman, D. M. LCDR, Supply Corps, USN	An Analysis of Models for Forecasting Repairable Carcass Networks	281
Hock, A. R. CPT, USA	Electronic Warfare Module of the Simulation of Tactical Alternative Responses (STAR) Module	282
Linhart, R. J., Jr. CAPT, USMC	See title listed under Applied Mathematics	
Linnebur, D. G. CAPT, USMC	A Graphical Test Bed for Analyzing and Reporting the Results of a Simulation Experiment	283
Lord, P. H. CAPT, USMC	An Examination of the United States Air Force Optimal Nonnuclear Muni- tions Procurement Model	284

Lott, J. N. CAPT, USMC	An Investigation of a Steady State, Allocation Model for Military Manpower Planning	285
Maddox, S. L. CPT, USA	See title listed under Hock, A. R.	
Main, S. C. CPT, USA	The Engineer Effects Module for the Star Combat Model	286
McCorkle, J. W., Jr. LT, USN	Tactical Motion Analyzer (TMA)	287
McGrann, T. J. CPT, USA	See title listed under Bucha, P. J.	
McKenzie, C. J. III CPT, USA	Deterministic Aggregated Model of Star on the Apple Computer (DAMSTAC)	288
Merrit, J. W. LT, USN	Radar Model with Terrain Effects	289
Mikas, M. M. CDR, Venezuelan Navy	An Approach to Reduce Skill Loss of the Unrestricted Line Officer in the Venezuelan Navy	290
Molina, M. I. C. CDR, Venezuelan Navy	A Damage Assessment Model for Surface Engagement for Missile and Gunfire	291
Mudd, J. V. CPT, USA	See title listed under Main, S. C.	
Owens, C. D. LT, USN	TEMPOA: An Interactive Simulation for the Apple-II Microcomputer	292
Pawlowski, T. J. III CPT, USA	See title listed under McKenzie, C. J.	
Peters, H. E. MAJ, German Air Force	Implementation of a Reliability Shorthand on the TI-59 Handheld Calculator	293
Pritchett, C. W.	A Game Theory Approach to Search	294
Riddle, T. H. CPT, USA	A Systems Approach to Contingency Modelling	295
Russell, T. G. LCDR, USN	A Navy Officer Assignment Model	296

Sharpe, H. H. LT, USCG	Search and Rescue Resource Allocation Using the M/E _k /c QUEUE	297
Snider, K. F. CPT, USA	An Analytical Approach for Assessing Vulnerability to Counterfire	298
Snyder, T. L. CPT, USA	See title listed under Riddle, T. H.	
Vick, J. D. CAPT, USMC	An Optimization Approach to Study the Distribution of the Coefficient of Determination, R ²	299
Wampler, R. L. CPT, USA	See title listed under Furman, J. S.	
Watkins, H., III LT, USN	An Application of Rayleigh Curve Theory to Contract Cost Estimation and Control	300
Weber, R. CPT, German Army	Proposals for the Evaluation of Personnel Readiness During a Company Inspection in the German Army	301
Wilson, J. O. LT, USN	An Interavtive Microcomputer Wargame for an Air Battle	302
Yount, M. L. LCDR, Supply Corps, USN	Distributional Analysis of Inventory Demand Over Leadtime	303
<u>PHYSICS</u>		305
Athow, L. K. LCDR, USN	Real Gas Considerations for Deter- mining Physical and Thermodynamic Properties of Gasses Involved in the Prediction of the Effects of Internal Explosions	307
Beard, M. W. CPT, USA	Power Spectra of Geomagnetic Fluctua- tions Between 0.02 and 20 Hz	308
Beelby, M. H. LCDR, USN	A Study of the Breakdown Mechanism of ASI 304 Stainless Steel. Type 2024 Aluminum and Various Titanium Coatings	309
Boudreaux, J. C., III LCDR, USN	Atmospheric Effects on Ultra High Frequency Radio Propagation	310

Brown, L. J. LT, USN	Stimulated Cerenkov Radiation Produced by 100 MeV Electrons	311
Cooke, R. R. CPT, USA	Scintillation Analysis of Gamma Radiation with Crystals of Bismuth Germanate	312
Fisher, W. A. LT, USCG	Instrumental Photon Activation Analysis Using the Linear Acceleration at the Naval Postgraduate School	313
Hodgini, T. J. CPT, USA	Optical Scintillation Measurements for Single and Folded Paths	314
Jung, J. W. LTCOL, Korean Army	The Construction of a Nd: YAG Laser	315
Metheny, R. M. CPT, USA	An Investigation of Energy Coupling in Various Arc Susceptible and Resistant Conductors	316
Thacker, J. R. LT, USCG	A Field Visibility Comparison Between Electroluminescent Sources and Standard U.S. Coast Guard Incandescent Aids-to-Navigation Sources	317
Ulrich, H. G., III LCDR, USN	See title listed under Beelby, M. H.	
<u>SYSTEMS TECHNOLOGY ANTISUBMARINE WARFARE (ASW)</u>		319
Brower, D. A. LT, USN	Marine Atmospheric Boundary Layer and Inversion Forecast Model	321
Cox, S. A. LCDR, USN	Satellite Applications to Acoustic Predictions System	322
Crawford, B. W. LCDR, USN	An Analysis of the Effectiveness Evaluation Process for VP Anti-submarine Warfare Fleet Replacement Squadron Aircrew Training	323
Hart, R. H. LT, USN	SH-3 Helicopter/Global Positioning System Integration Analysis	324
Harvey, L. M. LT, USN	Application of the Sonar Equations to Bistatic Echo-Ranging	325

Schweiger, J. M. LT, USN	Evaluation of Geomagnetic Activity in the MAD Frequency Band (.04 to 0.6 Hz)	326
<u>SYSTEMS TECHNOLOGY COMMAND, CONTROL AND COMMUNICATIONS (C3)</u>		327
Bruck, L. A. MAJ, USAF	Tactical Situation Displays and Figurative Symbology	329
Calcaterra, F. S. LCDR, USN	Applications of Artificial Intelli- gence in Voice Recognition Systems in Microcomputers	330
Clark, L. N. CAPT, USAF	A Communications Processor for C3 Analysis and Gaming	331
Crager, S. R. LT, USN	A Computer Program for Investigating Atmospheric Effects on Laser Designators	332
Fotheringham, P. W. CPT, USA	An Input/Output Filter Program for the Warfare Environment Simulation (WES)	333
Fox, T. W. MAJ, USAF	An Investigation of the Dynamic Model of Modern Military Conflict	334
Hill, P. W. CAPT, USAF	See title listed under Bruck, L. A.	
Johnson, S. K. CPT, USA	An Investigation of a Land Combat Tactical Commander's Decision- Making Process	335
Keller, S. M. CAPT, USAF	The Susceptibility of Jintaccs Messages to Jamming	336
Malarkey, T. R.	An Investigation of the Application of Voice Input/Output Technology in the Coins Network Control Center	337
Pless, L. D. CAPT, USAF	See title listed under Clark, L. N.	
Rapp, R. L. MAJ, USAF	See title listed under Clark, L. N.	
Reese, R. J. CPT, USA	Analysis of the Reliable Sting Early Warning System	338

Ruess, J. C. CAPT, USAF	Investigation into Air Launch Cruise Missile (ALCM) Flight Information Loading & Display Techniques During Flex Targeting Procedure	339
----------------------------	--	-----

<u>SYSTEMS TECHNOLOGY ELECTRONIC WARFARE (EW)</u>	341
---	-----

White, T. W. CAPT, USAF	Positioning of Jamming Aircraft Using the Integrated Refractive Effects Prediction System	343
----------------------------	---	-----

<u>TELECOMMUNICATIONS SYSTEMS MANAGEMENT</u>	345
--	-----

Brown, N. E. LT, USN	Improving the Electronic Capabili- ties in the Fleet	347
-------------------------	---	-----

Collins, W. B. MAJ, USMC	Application of Selected Software Cost Estimating Models to a Tactical Communications Switching System: Tentative Analysis of Model Applica- bility to an Ongoing Development Program	348
-----------------------------	---	-----

Fishburne, L. E. LCDR, USN	Lessons Learned in Communications Services Contracting	349
-------------------------------	---	-----

Sheedy, A. M. LT, USN	Acquisition of Telecommunications in the Navy From an Automatic Data Processing (ADP) Point of View	350
--------------------------	---	-----

Wolf, S. P. LT, USCG	A Communications Traffic Flow Simulation Model of the Message Switching Systems	351
-------------------------	---	-----

MASTER OF ARTS DEGREES

<u>NATIONAL SECURITY AFFAIRS</u>	353
----------------------------------	-----

Barthelemy, R. E. CPT, USA	Residents of Lubyanka: A Study of the Soviet Committee for State Security, the KGB	355
-------------------------------	--	-----

Cordasco, M. F., Jr. LCDR, USN	United States Policy Options in the Western Indian Ocean	356
-----------------------------------	---	-----

Cummings, K. P. LCDR, USN	The New British Deterrent: Strategic Planning and Domestic Political Implications	357
------------------------------	---	-----

Grunwald, K. G. CPT, USA	The Gauntlet Cast: Poland Challenges the Soviet Union	358
Hasson, N. F. CPT, USA	Demographics, Economics, and the Soviet Armed Forces: Implications for U.S. National Security Policy	359
Hopkins, M. K. MAJ, USA	The U.S. and the FRG in the Third World	360
Keenan, S. T. LT, USN	Spain at Europe's Crossroads: <u>Pros- pects for Spanish Integration to the North Atlantic Treaty Organization and the European Economic Community</u>	361
Krynovich, D. G. CPT, USA	The NATO Alliance: US Conventional Force Level Options Toward it Based on US National Interests	362
Leonard, D. L. LT, USN	France, West Germany, and the Security of the Persian Gulf	363
Maggi, R. W. LCDR, USN	An Estimate of Some Strengths and Weaknesses of the Soviet Naval Officer That Could Affect His Performance in Future Combat	364
Marenic, G. T. CAPT, USAF	Effects of Military Development on Economic Growth in North and South Korea, 1945-1980	365
Price, T. M. LT, USN	Soviet-Indian Relations and the Indian Ocean as a Zone of Peace	366
Menendez, J. C. CAPT, USAF	Influence: U. S. National Interest and the Republic of the Phillipines	367
Myers, A. C. LCDR, USN	Soviet Foreign Policy Towards Greece and Turkey: Contrast Within Coherence	368
Riley, M. F. CPT, USA	Zimbabwean Nationalism and the Rise of Robert Mugabe	369
Sim, R. W. LCDR, USN	Japan Resource Dependence	370
Smith, D. V. LCDR, USN	The Phantom Fleet--Foreign Flags on U.S. Ships	371

Sniffin, E. M. LCDR, USN	The International Politics of Spanish Accession to NATO	372
Tatsch, L. M. CAPT, USAF	The German Reunification Issue: A Soviet Perspective	373
Thompson, M. A. CPT, USA	The Northern Territories: Case Study in Japanese-Soviet Relations	374
Voros, C. D. LCDR, USN	Spain: Democracy and the Military	375
Young, G. D. LT, USN	Mutiny on Storozhevoy: A Case Study of Dissent in the Soviet Navy	376

DOCTOR OF PHILOSOPHY
IN
ELECTRICAL ENGINEERING
AND
DOCTOR OF ENGINEERING

SYSTEMATIC EXPERIMENTAL DETERMINATION OF DISCRETE-TIME
MODELS FOR NONLINEAR SYSTEMS

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B.S., Drexel Institute of Technology, 1969

M.S., The University of Connecticut, 1973

M.S., United States Naval War College, 1976

Techniques are presented for experimentally computing discrete-time model equations from a finite set of sampled observations of the system inputs and outputs. Existing modeling techniques typically consider simple model forms, and often make limiting assumptions and simplifications for mathematical convenience. This research extends these techniques to efficiently obtain a more accurate model equation. Four key points are examined: (1) form of the model equation, (2) choice of the error minimization technique, (3) efficiency of model determination and evaluation algorithms, and (4) interpretation of the obtained model equations in typical applications.

A new algorithm for efficient model determination, the Search Indicator Growth Algorithm, is presented. This iterative algorithm efficiently evaluates a set of model terms and eliminates the undesired terms. The technique produced more accurate and robust model equations, and offers significant computational advantages over existing techniques. Computer simulated experiments illustrate the effectiveness of this method.

Doctor of Philosophy in
Electrical Engineering
June 1982

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Computer Science

A COMBUSTION AND HEAT TRANSFER MODEL FOR POROUS MEDIA

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A general combustion and heat transfer model for porous media subject to Darcy flow is formulated. The transient one dimensional model treats the combustion process in two phases. During the initial phase, combustion occurs within the porous medium. The second phase occurs when the exothermic reaction moves to the air inlet surface of the medium resulting in surface recession. The temperature dependency of the system parameters and thermophysical properties is taken into account. An analysis of combustion in a carbon porous medium is presented, as well as an assessment of the accuracy of the model.

Doctor of Engineering
June 1982

Advisor: D. Salinas
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DOCTOR OF PHILOSOPHY

A COMPARISON OF TWO INITIALIZATION METHODS
IN DATA ASSIMILATION

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Two different initialization methods were developed and tested in global data assimilation experiments covering a five-day period. One method was based on the nonlinear normal mode initialization, and the other was based on the balance equation. Both techniques were developed using the calculus of variations methodology. In both methods, the initial divergence was computed from the forecast first-guess fields, except it was partially modified in the nonlinear normal mode method to improve the balance.

The assimilation system used to test the initialization methods was developed for the global forecast model at the Fleet Numerical Oceanography Center. This model was adapted from the general circulation model developed at the University of California at Los Angeles. A comparison of the gravity wave noise from the two methods is given for versions of the model with and without heating. Other comparisons are given for divergence, precipitation rates, wave structure and cyclogenesis. The two methods are similar in their performance in data assimilation. The balance equation method is more flexible in weight specification and, consequently the forecasts verify with observations closer than the normal mode method.

Doctor of Philosophy
June 1982

Advisor: G. J. Haltiner
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Meteorology

DYNAMIC MULTICOMMODITY FLOW SCHEDULES

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M.S.E.E., Technion-Israeli Institute of Technology, 1974

Some new results in the scheduling of dynamic multicommodity flows in data communication networks are presented.

A new performance measure for effective delivery of backlogged data to their destinations is defined and the solution to the resulting delivery problem is obtained through a sequential linear optimization methodology. Properties of an optimal dynamic multicommodity flow schedule are studied in detail, taking advantage where possible of linear programming formulation. The special case of the delivery problem in a single destination network also is analyzed.

Application of the results to stochastic delivery problems in which the data inputs to the network are modelled as Poisson processes is addressed, and a new dynamic data communication network analysis is presented.

Finally, the delivery problem on networks with capacitated links and with traversal delays is considered and some new results obtained.

Doctor of Philosophy
December 1981

Advisor: J. M. Wozencraft
Department of
Electrical Engineering

EXTENSION OF SOME MODELS FOR POSITIVE- VALUED TIME SERIES

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M.S., Naval Postgraduate School, 1973

Time series models with autoregressive, moving average and mixed autoregressive-moving average correlation structure and with positive-valued non-normal marginal distributions are considered. First a flexible mixed model GLARMA(p,q) with Gamma marginals is investigated. The correlation structure for several special cases is derived. For the first-order autoregressive case, GLAR(1), the conditional density of X_n given X_{n-1} is derived. This leads to the formation of a likelihood function and a numerical approximation to and a simulation study of the maximum likelihood method of parameter estimation. Multivariate extensions of the model are considered briefly.

Second, three methods for generating first-order moving average sequences with Exponential marginals are examined. These generalize the EMA(1) Exponential model. Negative correlation using antithetic variables is investigated in the moving average models.

A preliminary analysis of wind speed data obtained over a 15 year period in the Gulf of Alaska is presented. A model with four harmonic deterministic mean multiplying random innovative factors modeled by a GLAR(1) process is developed. Correlograms and periodograms are used to determine the model for the mean and the structure of the innovation process.

Doctor of Philosophy
March 1982

Advisor: P. A. W. Lewis
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Operations Research

EFFICIENT MULTICHANNEL AUTOREGRESSIVE MODELING
IN TIME AND FREQUENCY DOMAIN

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The single channel autoregressive lattice has been successfully applied to problems including speech analysis and recognition, spectral analysis and noise cancelling. More recently the two channel autoregressive (AR) lattice has been exploited for autoregressive moving average (ARMA) analysis of systems for modeling and identification.

This dissertation considers the multichannel AR lattice when applied to ARMA systems analysis. Constraints on lattice parameters, based on the input output relations of the system under test, are developed. The lattice is redefined in terms of the frequency domain representation of the input data. This proves to be useful because it allows the input to be normalized so that the lattice yields a consistent set of parameters independent of the test source characteristics. Lastly the lattice is redefined in terms of correlations of the input signals. This results in a computationally and storage efficient lattice algorithm.

Doctor of Philosophy
March 1982

Advisor: S. R. Parker
Department of
Electrical Engineering

OPTICAL SCINTILLATION ON FOLDED PATHS

Avihu Ze'evi

Major, Israel Air Force

B.Sc., The Hebrew University, Jerusalem, Israel, 1967

M.Sc., The Hebrew University, Jerusalem, Israel, 1974

Optical scintillation on folded paths has been investigated for the case of spherical waves and a plane mirror as a folding target. A criterion for the statistical independence of the two parts of the folded path was formulated, utilizing the path integral technique and the Von Karman spectrum. Employing the same approach, an expression for the scintillation strength (the log-intensity variance) on folded paths has been developed. It has been shown that the scintillation strength on folded paths can be expressed as a product of the one-way scintillation strength and a function of the distance source-detector in units of the outer scale. The analytical prediction shows that the ratio of the log intensity variances on the folded paths to the one on the one-way path, goes from $2^{17/6}$ for exact folding (the distance source-detector is zero), to $2^{11/6}$ when the detector is far away from the source. The theoretical predictions have been corroborated by preliminary field experiments.

Doctor of Philosophy
March 1982

Advisor: E. C. Crittenden, Jr.
Department of
Physics

AERONAUTICAL ENGINEER

PREVIOUS PAGE
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PARTICLE SIZE DETERMINATION IN SMALL SOLID PROPELLANT
ROCKET MOTORS USING THE DIFFRACTIVELY
SCATTERED LIGHT METHOD

Robert Grewelle Cramer, Jr.
Captain, United States Army
B.S., Washington State University, 1973

A dual beam apparatus was developed which simultaneously measured particle size (D_{32}) at the entrance and exit of an exhaust nozzle of a small solid propellant rocket motor. The diameters were determined using measurements of diffractively scattered laser power spectra. The apparatus was calibrated by using spherical glass beads and aluminum oxide powder. Measurements were successfully made at both locations. Because of the presence of char agglomerates in the exhaust, continued effort is required to improve the grain design in order to obtain consistent "across nozzle" data.

Aeronautical Engineer's Degree and
Master of Science in
Aeronautical Engineering
October 1982

Advisor: D. W. Netzer
Department of
Aeronautics

FINITE ELEMENT PROGRAM FOR CALCULATING
FLOWS IN TURBOMACHINES WITH RESULTS
FOR NASA TASK-1 COMPRESSOR

Julian A. Ferguson III
Lieutenant, United States Navy
B.S., Auburn University, 1975

A general mesh generation code (MESHGEN) and finite element flow solver (TURBO) for calculating the flow development through axial turbomachines are fully documented. The finite element approach followed Hirsch and Warzee. Excellent results were obtained for the NASA Task-1 compressor operating with subsonic flow conditions. Construction of the code will allow straightforward extension to transonic flows, turbine stages and multiple stage machines.

Aeronautical Engineer's Degree and
Master of Science in
Aeronautical Engineering
October 1982

Advisor: R. P. Shreeve
Department of
Aeronautics

AUTOMATIC CONTROL AND DATA ACQUISITION SYSTEM
FOR COMBUSTION LABORATORY APPLICATIONS

Bertel J. Hansen
Lieutenant, United States Navy
B.S.E.E., North Carolina State University, 1975

A modern computer based automatic data acquisition/control system was installed at the Department of Aeronautics' Combustion Laboratory. This system utilizes an HP-85 desktop computer as system controller for the HP-3054A data acquisition system. These major control applications include: (1) particle size determination by measurement of scattered laser light, (2) a vitiated air heater system, and (3) a solid fuel ramjet test unit. Details involving specific data acquisition/control techniques for these applications are discussed.

*Aeronautical Engineer's Degree and
Master of Science in
Aeronautical Engineering
October 1982*

Advisor: D. W. Netzer
Department of
Aeronautics

ASYMMETRIC REINFORCEMENTS OF A QUASI-ISOTROPIC GRAPHITE
EPOXY PLATE CONTAINING A CIRCULAR HOLE

Gary Sean O'Neill
Lieutenant, United States Navy
B.A.E., Georgia Institute of Technology, 1975

The response to uniaxial loading of a graphite epoxy panel containing a one-inch diameter hole was analyzed by finite element analysis and tested experimentally. The analysis modeled the basic unreinforced panel and six different asymmetric reinforcements consisting of additional layers of the same material of circular shape on one side of the panel laminate. The reinforcement configurations varied the volume of the reinforcement from 94% to 162% of the volume of the material removed by the hole, the number of reinforcing layers (1 to 4) and the outer radius of the reinforcement layers from 0.75 inches to 1.5 inches. The orientation of the reinforcing layers was either 45° or 0° to the load direction. Results of the computational analysis indicated that the reduction of maximum strain (in the direction of the load at a point at the edge of the hole 90° from the load direction) by the reinforcements was at most 12%, with apparent dependence on the number of layers used and the volume of the reinforcement. Experimental testing of three of the configurations confirmed the accuracy of the finite element analysis and demonstrated that the reinforced panels recovered 5 to 10% of the basic laminate strength above that of the reinforced panel. In addition to the computational analysis, two isotropic empirical predictions for stress (strain) concentration at the edge of a circular hole were examined to determine their applicability to asymmetric reinforcements of a quasi-isotropic panel, with mixed results.

Aeronautical Engineer's Degree and
Master of Science in
Aeronautical Engineering
June 1982

Advisor: M. H. Bank
Department of
Aviation Safety

THE LATERAL RESPONSE OF AN AIRSHIP TO TURBULENCE

John J. Wrobleski, Jr.
Lieutenant, United States Navy
B.A.E.M., University of Minnesota, 1975

A method is derived for finding the linear response and loading transfer functions for the lateral aerodynamic case of airship flight through atmospheric turbulence. The functions obtained are in a form that can be applied to the various spectral analysis methods used to predict survivability currently employed by designers. A numerical example using the USS AKRON (ZR-4) is presented. The results show that peak motion response and loading occur when the encountered spectral component has a wavelength, and that simple feedback of heading angle does not significantly decrease this peak.

Aeronautical Engineer's Degree and
Master of Science in
Aeronautical Engineering
December 1981

Advisor: D. M. Layton
Department of
Aeronautics

ELECTRICAL ENGINEER

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SHIFT AND SCALE INVARIANT PREPROCESSOR

Norman E. Huston, Jr.
Lieutenant Commander, United States Navy
B.S.E.E., and B.N.S., University of Wisconsin, 1971

A preprocessor is designed to extract a set of features that enhance natural clustering by removing extraneous information. The design removes time shift and scale dependence by taking advantage of invariant properties of a Fourier transform followed by a Mellin transform. The preprocessor is realized using an FFT and a Mellin transform with a conventional error correction term. The error term proves to be indeterminate, but the error's bound is identified as the envelope for Mellin correction terms. Properties of the Mellin transform are employed to modify the signal so that the error correcting is no longer required. The resulting algorithms are tested with variously scaled inputs for which closed form solutions are known. With a verified modification in place, the preprocessor produces features that are invariant to shifting and scaling, while retaining enough information to classify canonic shapes. A method of improving performance is introduced.

Electrical Engineer Degree and
Master of Science in
Electrical Engineering
December 1981

Advisor: L. A. Wilson
Department of
Electrical Engineering

MECHANICAL ENGINEER

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OPTIMIZATION OF THREE DIMENSIONAL COMBINED TRUSS/FRAME STRUCTURES

Gregory L. Bender
Lieutenant, United States Navy
B.S.Nuc.Eng., North Carolina State University, 1974

A finite element code is developed for analysis and design of three dimensional truss and frame structures. Structures are designed for minimum weight subject to constraints on: member stresses, Euler buckling, shell buckling, joint displacements and system natural frequencies. Structures are optimized with respect to member size and structure configuration.

The finite element code may be used for analysis only, or may be coupled to an optimizer of the user's choice. The displacement method is used for static analysis, and structure natural frequencies are calculated via the subspace iteration method.

Flexibility is provided for expansion to other than tubular frame elements, and provisions are made for the future growth to panel and other types of structural elements.

Documentation is provided to facilitate use of the code. A User's manual is presented with examples and results. An explanation of how this code may be coupled to an optimizer is also provided.

Mechanical Engineer's Degree and
Master of Science in
Mechanical Engineering
October 1982

Advisor: G. N. Vanderplaats
Department of
Mechanical Engineering

ENTRAINMENT MODELLING OF BUOYANT MOMENTUM JETS IN WATER

David Stuart Hilder
Lieutenant, United States Navy
B.S., University of New Mexico, 1975

The general characteristics of buoyant momentum jets in water are described. Previous analytical modelling techniques utilizing the entrainment concept for prediction of trajectory and residual physical properties are discussed, and an overview of the existing experimental data base is given. The limitations of previous analytical modelling techniques are enumerated, generally resulting from incomplete or inadequate equations of state. An existing comprehensive equation of state for pure and saline water is proposed for use in entrainment modelling. An original computerized procedure, based on appropriate conservation equations, is used to predict trajectory and physical properties of various buoyant momentum jets. Comparison is made with previous analytical and experimental results for the cases of quiescent, flowing and stratified ambients. Finally, the comprehensive equation of state, coupled with the present computational procedure, is used to describe a complexly stratified ambient and the behavior of a buoyant momentum jet discharged into it.

Mechanical Engineer Degree and
Master of Science in
Mechanical Engineering
December 1981

Advisors: B. Gebhart
M. Kelleher
Department of
Mechanical Engineering

A VERSION OF THE GRAPHICS-ORIENTED INTERACTIVE
FINITE ELEMENT TIME-SHARING SYSTEM (GIFTS)
FOR AN IBM WITH CP/CMS

Ronnie Hundley
Lieutenant, United States Navy
B.S., University of Washington, 1974

A version of the Graphics-oriented, Interactive, Finite element, Time-sharing System (GIFTS) has been developed for, and installed on, an IBM computer with the Conversational Monitor System (CMS). GIFTS, developed at, and available from the Interactive Graphics Engineering Laboratory of the University of Arizona, is an extensive code for static, transient, modal, and constrained substructural analysis of three dimensional truss, plate, shell, and solid finite element models. A brief description of GIFTS, including insights into its logic and structure necessary to the version's development, and an in-depth description of the method used to invoke CMS commands from the executing program for the purpose of the data base management are provided. The version, making use of the Tektronix 4000 series graphics terminals, is self-contained and portable, allowing its installation on other IBM computers with the CMS operating system.

Mechanical Engineer's Degree and
Master of Science in
Mechanical Engineering
March 1982

Advisor: G. Cantin
Department of
Mechanical Engineering

MASTER OF SCIENCE
IN
AERONAUTICAL ENGINEERING

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AN INVESTIGATION OF THE EFFECTIVENESS
OF SMOKE SUPPRESSANT FUEL ADDITIVES
FOR TURBOJET APPLICATIONS

John Robert Bramer
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Seven fuel additives were tested to investigate their effectiveness at reducing exhaust stack gas opacity in a turbojet test cell. Exhaust partical sizes and mass concentrations were determined at the engine and stack exhausts using measurements of light transmittance at three frequencies. Particle samples were also collected at the engine exhaust and measured with a scanning electron microscope to verify the optical technique. Nitrous oxide emissions were measured at the test cell stack exhaust.

Four of the additives tested were found effective at reducing stack exhaust opacity and particulate mass concentration. None of the additives had any measurable effect on particle diameters. No meaningful changes in particle size or mass occurred between the engine and stack exhausts. The optical technique for determining particle size was verified effective using the scanning electron microscope. No additive had any significant effect on nitrous oxide production.

Master of Science in
Aeronautical Engineering
October 1982

Advisor: D. W. Netzer
Department of
Aeronautics

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FLOW CONTROL FOR A HIGH ENERGY LASER TURRET USING
TRAPPED VORTICES STABILIZED BY SUCTION

James Edward Burd
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

The Department of Defense is concerned with the viability of an airborne high energy laser system. The laser is housed in a blunt turret atop a NKC-135 aircraft. Turbulence generated by flow separation around the turret causes optical distortion of the laser beam. Control of flow separation is needed to improve laser beam performance especially for aftaimed turrets.

One technique proposed for flow control is a fairing design which will stabilize shed vortices by suction. A two dimensional computer model was used to design a fairing compatible with present test equipment.

Experimental research of this fairing design was conducted in wind tunnel tests. Although flow mapping demonstrated improved flow performance through the use of suction, total quiescent flow was never achieved. A more adequate three dimensional model is needed to design a fairing that will stabilize trapped vortices.

Master of Science in
Aeronautical Engineering
December 1981

Advisor: A. E. Fuhs
Department of
Aeronautics

HAND-HELD COMPUTER PROGRAMS FOR
PRELIMINARY HELICOPTER DESIGN

Paul John Fardink
Major, United States Army
B.S., United States Military Academy, 1970

This project gives the user of the HP-41 handheld programmable calculator a series of programs that give acceptable results during the preliminary phases of the helicopter design process. The project consists of three parts.

The first part consists of several short programs and their subroutine form. These programs and subroutines compute density altitude, density, disc area, solidity, tip velocity, induced velocity, coefficient of thrust, tip loss factor, equivalent chord, and ground effect.

The second part consists of major subroutines. These subroutines compute profile power, induced power, climb power, parasite power, and total power; equivalent area and induced power for a tandem rotor; and data input and change.

The third part consists of the main programs. These programs compute the various power requirements for hovering flight, forward (straight and level) flight, vertical flight, and forward climbing flight; also tailrotor power, autorotative flight, and tandem rotor flight.

Master of Science in
Aeronautical Engineering
October 1982

Advisor: D. M. Layton
Department of
Aeronautics

A REVIEW AND ANALYSIS OF AIRCRAFT VULNERABILITY

Dennis Richard Ferrell
Lieutenant Commander, United States Navy
B.S., Oklahoma State University, 1971

Aircraft vulnerability with respect to physical damage inflicted by ballistic projectiles and warhead fragments is an issue of paramount importance to the conceptual designer. In order to determine the contribution of specific vulnerability reduction features, the designer must have a methodology available that satisfies his requirements. This thesis presents a broad overview of the methodologies that are currently available to the designer. It examines the capabilities of these methodologies to account for the six major vulnerability criteria: location, redundancy, passive damage suppression, active damage suppression, shielding, and component elimination. Also presented are explanations of vulnerability measures and the elements of assessment. In an attempt to provide the conceptual designer with a methodology that assesses the contribution of redundant components, a transition matrix analysis is developed with examples.

Master of Science in
Aeronautical Engineering
October 1982

Advisor: R. E. Ball
Department of
Aeronautics

POSTBUCKLING BEHAVIOR OF GRAPHITE/EPOXY CLOTH SHEAR
PANELS WITH 45°-FLANGED LIGHTENING HOLES

Richard John Herman
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973

An experimental and finite-element analysis was performed on graphite/epoxy cloth plates subjected to static shear loading. Two specimens were tested to failure for each of three configurations: a solid panel, a panel with an unreinforced hole and a panel with a 45°-flanged hole. Both a static nonlinear analysis and a bifurcation-buckling analysis were performed for each of the panel configurations. The 45°-flange reinforcement technique for cutouts in shear webs was found to be well-suited for use in non-buckling, graphite/epoxy cloth designs. However, an alternate hole-reinforcement technique is required for designs where buckling is allowed.

Master of Science in
Aeronautical Engineering
March 1982

Advisor: M. H. Bank
Department of
Aeronautics

EFFECTS OF WIND ON THE AIRCRAFT OPTIMUM CRUISE PERFORMANCE
AND FLIGHT PERFORMANCE ADVISORY SYSTEMS
FOR F-4E AND F-5E AIRCRAFT

Jaemyong Lee
Major, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1972

One of several fuel-saving operational concepts being investigated is the application of state-of-the-art hand-held calculators to serve as Flight Performance Advisory Systems (FPAS). The principal function of a FPAS is to advise the pilot, based on the aircraft drag configuration, and gross weight, of the optimum flight performance parameters such as altitude and airspeed. The research reported herein is the development of the mathematical relationships for the effects of the wind on the aircraft optimum cruise performance. This thesis also describes the operating procedure of a Hewlett-Packard H-41CV hand-held calculator programmed to serve as an F-4E and F-5E Flight Performance Advisory System. The objective of the FPAS is to recommend optimal flight profiles to achieve maximum fuel conservation. Because of the constraints imposed by HP-41CV memory size, the F-4E FPAS is comprised of three programs, and the F-5E FPAS is comprised of a single program.

Master of Science in
Aeronautical Engineering
June 1982

Advisor: A. E. Fuhs
Department of
Aeronautics

EXPERIMENTAL INVESTIGATION OF THRUST AUGMENTING
EJECTORS USING VANE EXCITED
PRIMARY JETS

Thomas Robert McClellan
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

An experimental investigation has been conducted to evaluate the entrainment characteristics of a thrust augmenting ejector, with a small, oscillating airfoil inserted in the potential core of the primary jet. Velocity distributions were measured across the width of the jet, at downstream distances of 20 and 40 nozzle widths, with the jet exhausting into still air and with the jet exhausting into an instrumented ejector shroud, for the following range of parameters: Pressure ratio 1.037 and 1.268, amplitude of oscillation 2.6° zero-to-peak, frequency of oscillation 0, 20, 40 and 60 Hz. Static pressure distributions were measured within the shroud when the ejector was installed. The results amplify previously conducted studies. Jet spreading and entrainment appear to increase with increasing amplitude and frequency of oscillation and to decrease with increasing nozzle pressure ratio.

Master of Science in
Aeronautical Engineering
March 1982

Advisor: M. F. Platzer
Department of
Aeronautical Engineering

A SIMULATOR EVALUATION OF PILOT RESPONSE TO
LOW FREQUENCY AIRCRAFT VIBRATION
WITH AUDIO FEEDBACK

Michael Wayne Mentas
Lieutenant, United States Navy
B.S., University Of Idaho, 1975

An aircraft simulator facility employing a two-axis air combat maneuvering simulation with whole body vibrational mode capability was used to investigate the pilot response to vibration and the performance enhancement technique of audio feedback cuing. The reliability of pilot response to a tracking task was measured in both the nonvibrational and vibrational mode with audio feedback cuing as a primary stimulus in testing. In general, performance scores in all modes of testing were improved using aural tracking techniques with a significant reversal of the adverse vibration stress duration function above expected values. Detailed conclusions and recommendations are presented.

Master of Science in
Aeronautical Engineering
March 1982

Advisor: D. M. Layton
Department of
Aeronautical Engineering

PRELIMINARY MEASUREMENTS AND CODE CALCULATIONS
OF FLOW THROUGH A CASCADE OF DCA
BLADING AT A SOLIDITY OF 1.67

William D. Molloy Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

An experimental program to obtain uniform inlet flow to the test blading in a large cascade facility designed to use inlet turning vanes, and to measure the conventional blade element performance, is described. Attempts to reduce non-uniformities ($\pm 1\%$ in velocity) using screens were unsuccessful and so abandoned. Preliminary DCA blade element performance data were obtained without screens at one incidence angle before aero-mechanical problems with the inlet guide vane assembly curtailed testing. The blade surface pressure distribution at the one test condition compared very favorably with the distribution predicted using the NASA computer code QSONIC. Recommendations were made that would avoid the aero-mechanical problems encountered.

Master of Science in
Aeronautical Engineering
June 1982

Advisor: R. P. Shreeve
Department of
Aeronautics

FIELD INSPECTION TECHNIQUES FOR BURIED STEAM
DISTRIBUTION LINES

Walter Neboshynsky
Lieutenant, United States Navy
B.S., United States Naval Academy, 1976

A practical method of measuring the heat loss in steam lines using a pitot-static flow meter and throttling calorimeters has been developed as well as a method for locating casing failures in buried pressure-testable steam lines using the inert non-toxic gas sulfur hexafluoride as a leak tracer and an ion capture device as a detector.

These methods require no knowledge of thermodynamic, mass transfer, or heat transfer theory. They are simple, quick, and inexpensive, and the equipment used is easily portable. Details sufficient for application by untrained field personnel as well as the results of several field tests are described.

Master of Science in
Aeronautical Engineering
June 1982

Advisor: J. A. Miller
Department of
Aeronautics

CALCULATION OF THE LONGITUDINAL STABILITY DERIVATIVES
AND MODES OF MOTION FOR HELICOPTER AIRCRAFT

Hugh James O'Neill
Major, United States Marine Corps
B.S., United States Naval Academy, 1969

This thesis presents an analysis of the longitudinal stability derivatives for helicopter aircraft and is intended to be used as a resource document for a helicopter stability and control course at the Naval Postgraduate School.

Emphasis is given to the evolution of forces and moments on the helicopter, calculation of the stability derivatives at high advance ratios, derivation of the stability determinant and solution of the characteristic equation to yield the modes of motion of the helicopter.

Master of Science in
Aeronautical Engineering
October 1982

Advisor: D. M. Layton
Department of
Aeronautical Engineering

AIRBORNE LASER TURRET FLOW CONTROL: A PARAMETRIC STUDY
OF WIND TUNNEL MODEL CONDITIONS

David Allen Rippel
Lieutenant Commander, United States Navy
B.A., University of Cincinnati, 1969

Wind tunnel tests were conducted on a one-third scale model of the USAF NKC-135 airborne laser turret and aerodynamic fairing. The model was constructed so that six main parameters could be varied as follows: fairing nosepieces, fuselage bleed slot position and condition (porous/nonporous), suction duct throttle position, blower suction throttle position, and the turret-fairing gap. The method of flow control employed to produce quiescent air flow about the turret was that of fuselage boundary layer and after-body fairing suction.

Results of the extensive testing indicate that the method is viable for low velocity, incompressible air flow. Additionally, optimum conditions (i.e., minimum suction required and the best combination of other parameters necessary to provide quiescent flow) were determined.

Master of Science in
Aeronautical Engineering
December 1981

Advisor: A. E. Fuhs
Department of
Aeronautics

EVALUATION OF HELICOPTER PILOT'S ATTITUDE CONTROL
USING A SIMULATED HEAD-UP DISPLAY IN A
SIMULATED HELICOPTER COCKPIT

Michael C. Stichter
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

As demands on the aviator's aeronautical, technical, and tactical skills increase, so must the employment of advanced cockpit design concepts. Advanced systems make for a reduced crew workload and a safer, more proficient mission capable aircraft. Six designated helicopter pilots (Navy, Marine Corps and Army) were evaluated on their ability to fly a simulated instrument flight regime using only a head-up display as an attitude reference. Flight and control simulation was obtained through the construction of a generic helicopter cockpit, with dynamic gage indications generated by an analog computer. Two head-up display flights were flown with the display in the 12 o'clock and 2 o'clock positions. Their results were compared to an initial flight using cockpit instrumentation only. All three flights were identical profiles. Pilots performance was recorded graphically with strip charts and reduced into three "performance zones". By averaging the percentage of time each pilot was in zone one, over each individual flight, it was shown that the average pilot's performance using the head-up display was within four to seven percentage points of their performance using only cockpit instrumentation.

Master of Science in
Aeronautical Engineering
June 1982

Advisor: D. M. Layton
Department of
Aeronautics

AN INVESTIGATION OF ENGINE AND TEST CELL OPERATING
CONDITIONS ON THE EFFECTIVENESS OF SMOKE
SUPPRESSANT FUEL ADDITIVES

Donald Wendell Thornburg
Lieutenant, United States Navy
B.S., University of Tennessee, 1974

Tests were conducted in a one-eighth scale turbojet test cell with a ramjet type combustor to investigate the effects of fuel additives on smoke reduction. Particle size and mass concentrations were determined at the engine and stack exhausts using three wavelength optical detector systems. Particulate samples were also collected at the engine exhaust and analyzed with a scanning electron microscope.

Combustor temperature and fuel additives were found to significantly affect particulate mass concentrations emitted from the engine while particle size appeared to be unaffected. No significant changes in the particulate size or mass occurred from the engine exhaust to the stack exhaust.

The optical determination of exhaust mean particulate size/mass concentration with three wavelength optical detector systems appears to be a good and reasonably accurate technique for evaluating the effects of engine and test cell operating conditions and fuel composition changes on the emitted particulates.

Master of Science in
Aeronautical Engineering
December 1981

Advisor: D. W. Netzer
Department of
Aeronautics

MASTER OF SCIENCE
IN
APPLIED MATHEMATICS

AN ALGEBRAIC STRUCTURE FOR THE CONVOLUTION
OF LIFE DISTRIBUTIONS

Danny L. Hogg
Captain, United States Marine Corps
B.S., Indiana State University, 1974

In this paper one method for analytically describing the life distribution of a system is investigated. This is done by using the inherent properties of convolutions and mixtures of life distributions to create an algebraic structure. Once the algebraic structure is constructed it can be used to develop algorithms to go from the schematic of a system to its survival function. It is noted along the way that combinations of constant failure rate components, e.g., redundant, series, or parallel systems can be described by a mixture of convolutions and that often these expressions can be greatly simplified.

Master of Science in
Applied Mathematics
October 1982

Advisors: J. D. Esary
Department of
Operations Research

T. Jayachandran
Department of
Mathematics

A STUDY OF FOUTZ'S MULTIVARIATE
GOODNESS-OF-FIT TEST

Richard John Linhart, Jr.
Captain, United States Marine Corps
B.S., United States Naval Academy, 1972

The empirical power of a new multivariate goodness-of-fit test proposed by Foutz (1980) is investigated. The test has been applied to Monte Carlo Samples from bivariate and trivariate normal distributions with a variety of mean vectors and covariance matrices. The null hypothesis tested is that the sample is from a multivariate normal distribution with 0 mean vector and covariance matrix the identity I. The observed number of rejections in 5000 replications is used as the measure of effectiveness of the test. The results indicate that the Foutz test is quite capable of detecting mean and variance shifts but is not as powerful against covariance shifts.

Master of Science in
Applied Mathematics
March 1982

Master of Science in
Operations Research
March 1982

Advisors: T. Jayachandran
R. Franke
Department of
Mathematics

H. J. Larson
Department of
Operations Research

MASTER OF SCIENCE
IN
COMPUTER SCIENCE

MAINTAINING THE INTEGRITY OF DISTRIBUTED DATABASE

Fahad A. Al-Lahaidan
Lieutenant, Royal Saudi Naval Forces
B.S.S.E., U.P.M. Dhahran, Saudi Arabia, 1978

The overall objective for distributed databases is that of sharing of data among several nodes. Increasing the number of users and the size of communication are two factors associated with distributed database systems. These factors, with others such as hardware, software and operations, are major factors which could originate threats to the distributed database integrity. Some discussion about these factors is presented.

Maintaining the data integrity has become a critical problem in distributed database fields. The problem requires a clear and precise view; it needs an early determination for meeting user requirements for integrity, since each organization has its own priorities.

This thesis examines integrity in general and presents some considerations and strategies to be spaced through different system levels such as design management, and operation and communication. The main idea of such approaches is to avoid the threats, or to reduce the risks.

Master of Science in
Computer Science
June 1982

Advisor: N. F. Schneidewind
Department of
Administrative Sciences

Department of
Computer Science

FUNCTIONAL PASCAL: AN INTERIM SOLUTION TO A CHANGING COURSE
IN PROGRAMMING LANGUAGE DEVELOPMENT

Otis Dennis Borcheller
Captain, United States Army
B.S., United States Military Academy, 1971

Ron Scott Ross
Captain, United States Army
B.S., United States Military Academy, 1973

The theory of pure functional programming is applied to the standard conventional programming language PASCAL, thereby offering a unique and innovative language for problem-solving. A basic set of primitive functions and functional forms, as outlined in the Backus FP System, provides a model for the development of a practical functional programming system. This system is activated by accessing a detailed and comprehensive system library module directly from a PASCAL program, thereby enabling the user to operate in either a functional or a conventional mode. The ability to perform functional programming within a conventional, high-level language, adds an increased degree of power and flexibility to the proposed system. The Functional PASCAL System provides the user with a new and distinctive methodology for writing computer programs and encourages individuals to experiment, in a practical environment, with functional programming techniques not otherwise available for general purpose use.

Master of Science in
Computer Science
June 1982

Advisor: B. J. MacLennan
Department of
Computer Science

DISTRIBUTED DATABASE MANAGEMENT SYSTEM
RECOVERY FROM NETWORK PARTITIONING

Eduardo E. Bresani
Lieutenant, Peruvian Navy
B.S., Peruvian Naval Academy, 1975

The purpose of this thesis is to analyze the operation of a distributed database management system under network partitions, review a number of existing methods proposed to deal with this problem and to present an alternate approach that will allow multiple operating partitions upon network partitioning.

When a network that supports a distributed database with redundant data becomes partitioned, each partition may function separately. Due to this, independent updates at each partition may cause inconsistencies to arise. At network reconnection time such divergent data, in particular copies of the same data in different partitions have to be reconciled. There is no known general method for doing so. Existing solutions are often unacceptable because system availability is reduced. Two recently proposed methods that allow continuous operation of multiple partitions may work for certain applications but are not general enough.

Master of Science in
Computer Science
June 1982

Master of Science in
Information Systems
June 1982

Advisors: N. Lyons
Department of
Administrative Sciences

D. Badal
Department of
Computer Science

ADAPTATION OF A KNOWLEDGE-BASED DECISION-SUPPORT SYSTEM
IN THE TACTICAL ENVIRONMENT

William C. Clair
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973

Ronald F. Danhof
Captain, United States Army
B.S., United States Military Academy, 1973

A knowledge-based computer system, with its foundation in Artificial Intelligence, would be a valuable asset to the military tactical commander. Current systems are slow, large, expensive, inflexible and therefore, impractical for use in the tactical environment. A detailed design of a prototype small-computer-based system is presented which processes and interprets intelligence and tactical information to assist tactical commanders in making decisions. The system, TAC*, for "Tactical Adaptable Consultant", incorporates a database, a knowledge base, their associated management systems, and distributed interface. Emphasis is placed on the representation and processing of two types of information: data about the real world; and knowledge about what that data means.

Master of Science in
Computer Science
December 1981

Advisor: D. R. Smith
Department of
Computer Science

IMPLEMENTATION OF THE VGM GRAPHICS SYSTEM ON THE PDP 11/50
UNDER THE RSX-11M OPERATING SYSTEM AND CONSTRUCTION OF
COMPATIBLE SOFTWARE DRIVER FOR THE RAMTEK RM-9400

Patrick Michael Comi
Lieutenant, United States Navy
B.S., Union College, 1970

In 1977 the ACM Special Interest Group for Graphics (SIGGRAPH) formed the Graphics Standards Planning Committee (GSPC) to develop a standard for the industry. The result of their efforts was the CORE graphics system. This study discusses that system and the issues involved in its creation. It describes Bell Northern Research's approach to implementing CORE with their Virtual Graphics Machine (VGM).

The installation of VGM at the Naval Postgraduate School on a PDP 11/50 with the RSX-11M operating system is described as well as the initial efforts to expand it to drive the Ramtek RM-9400 Graphics Display System.

Master of Science in
Computer Science
June 1982

Advisor: G. A. Rahe
Department of
Computer Science

REPRESENTATION TECHNIQUES FOR RELATIONAL LANGUAGES AND
THE WORST CASE ASYMPTOTICAL TIME COMPLEXITY
BEHAVIOR OF THE RELATED ALGORITHMS

Suha Futaci
Lieutenant (Junior Grade), Turkish Navy
Turkish Naval Academy, 1976

This thesis is aimed at determining the worst case asymptotical time complexity behaviour of algorithms for relational operations that work on extensionally or intensionally represented binary relations. Those relational operations come from a relational language being designed at Naval Postgraduate School. One particular extensional representation technique and two intensional representation techniques are proposed. The above analysis in turn determines the feasibility of implementing a subset of the relational language on conventional architectures.

Master of Science in
Computer Science
June 1982

Advisor: B. J. MacLennan
Department of
Computer Science

DEADLOCK DETECTION IN DISTRIBUTED COMPUTING SYSTEMS

Michael Thomas Gehl
Lieutenant Commander, United States Navy
B.S., Iowa State University, 1971

With the advent of distributed computing systems, the problem of deadlock, which has been essentially solved for centralized computing systems, has reappeared. Existing centralized deadlock detection techniques are either too expensive or they do not work correctly in distributed computing systems. Although several algorithms have been developed specifically for distributed systems, the majority of them have also been shown to be inefficient or incorrect. Additionally, although fault-tolerance is usually listed as an advantage of distributed computing systems, little has been done to analyze the fault tolerance of these algorithms. This thesis analyzes four published deadlock detection algorithms for distributed computing systems with respect to their performance in the presence of certain faults. A new deadlock detection algorithm is then proposed whose efficiency and fault tolerance are adjustable.

Master of Science in
Computer Science
June 1982

Advisor: D. Badal
Department of
Computer Science

ADAPTATION OF MAGNETIC BUBBLE MEMORY IN A
STANDARD MICROCOMPUTER ENVIRONMENT

Michael S. Hicklin
Captain, United States Marine Corps
B.S.M.E., University of Utah

Jeffrey A. Neufeld
Captain, United States Marine Corps
B.S.S.E., United States Naval Academy

Magnetic bubble memory is a new digital storage technology that offers many significant advantages over currently existing secondary storage media. Bubble memories, with high densities and relatively fast access times, are non-volatile semiconductor devices that provide a high degree of reliability in harsh environments. This technology has the potential for a vital and unique role in both the civilian and military computing environments due to the combination of characteristics exhibited by magnetic domain devices.

This thesis presents an implementation of a magnetic bubble device utilizing a conventional operating system, Digital Research's CP/M-86, and a standard commercial 16-bit microcomputer, the Intel iSBC 86/12A. A fully operational system capable of testing, evaluating and utilizing a magnetic bubble device in a standard user environment is presented.

Master of Science in
Computer Science
December 1981

Advisor: LCDR. R. R. Stilwell
Department of
Computer Science

DESIGN AND IMPLEMENTATION OF A PERSONAL
DATABASE MANAGEMENT SYSTEM

Peter L. Jones
Captain, United States Marine Corps
B.S., University of Washington, 1975

The Personal Database Management System is a hardware and software system designed to support people's memory and recall processes. It is a small, low power, and inexpensive microcomputer system which employs E²PROM and CMOS technology. The design is based upon how people manage their personal information, which was found to be different from the ways conventional computerized systems manage information.

Master of Science in
Computer Science
June 1982

Advisor: D. Z. Badal
Department of
Computer Science

IMPLEMENTATION OF A REAL-TIME, DISTRIBUTED OPERATING SYSTEM
FOR A MULTIPLE COMPUTER SYSTEM

Stephen G. Klinefelter
Captain, United States Army
B.S., Virginia Military Institute, 1974

This thesis presents extensions to an implementation of a kernel in a real-time distributed operating system for a microcomputer based multi-processor system.

The operating system, MCORTEX, is a 2 level, hierarchically structured, loop free, system that permits logical distribution of the kernel in the address space of each process. The design is based on segmented address spaces and per process stacks. Process synchronization is achieved through sequencers and eventcounts. MCORTEX is resident in the local memory of each microcomputer but system data is maintained in shared global memory.

MCORTEX has been extended to include a system monitor process which allows stopping the system to examine any memory, shared or local, from any location. The system can then be restarted without reinitializing each microcomputer.

This system particularly supports applications where jobs are partitioned into a set of multiple interacting asynchronous processes. The system is currently implemented on INTEL 86/12A single-board computers.

Master of Science in
Computer Science
June 1982

Advisor: U. R. Kodres
Department of
Computer Science

A DECISION SUPPORT SYSTEM FOR U.S.
ARMY UNIT STATUS REPORTING

George F. Kolesar
Major, United States Army
B.S., United States Military Academy, 1967

The Unit Status Report is the method employed by U.S. Army units to report their combat readiness to the Department of the Army and the Joint Chiefs of Staff. This critically important information is currently acquired, processed and transmitted using manual methods that do not take advantage of the latest developments in computer technology.

An alternate method is presented that uses a Decision Support System to assist the unit commander to accurately and efficiently process his data and determine the correct combat readiness rating to report.

The paper includes a general description of Decision Support Systems and the specific design, including a computer program written in Pascal, of a Decision Support System to improve the reporting method.

Master of Science in
Computer Science
June 1982

Advisor: N. R. Lyons
Department of
Administrative Sciences

INVESTIGATION OF THE ADA LANGUAGE IMPLEMENTATION OF THE
HELLENIC COMMAND CONTROL AND INFORMATION SYSTEM

Apostolos Koutsotolis
Commander, Hellenic Navy
Hellenic Naval Academy, Greece, 1963

This thesis examines the features of the Ada language, describes the structure of the Hellenic Command Control and Information System (HCCIS) and investigates the use of Ada for the program development of HCCIS.

The Ada high order programming language system is being procured to act as a standard for the implementation of future United States embedded computer systems. Many benefits are claimed from this approach for software engineering and management practice. HCCIS is a future system which will provide a network of automatic data processing support at Commands.

Master of Science in
Computer Science
June 1982

Advisor: U. R. Kodres
Department of
Computer Science

PERFORMANCE ANALYSIS OF COMPUTER INSTALLATIONS
VIRTUAL MACHINE/370 (VM/370)

Waldo Marmanillo Lazo
Lieutenant, Peruvian Navy
B.S., Peruvian Naval Academy, 1974

Highlights of the IBM 4341 and IBM 3033 AP systems are presented, with emphasis on Performance aspects. An analysis of Performance of the Virtual Machine Facility 370 (VM-370) is performed. The main efforts are (1) to present a methodology based on performance measurement and analysis techniques, trying to relate the trends in the data to the characteristics of the system, and thus gain an insight into what might cause the system to saturate and its performance to degrade, (2) analyze the statistical correlations among performance and resource usage variables in order to estimate the degree of association among these variables, (3) identify those variables that are good indicators of system load, (4) formulate regression equations for forecasting the system performance.

This thesis is an effort toward the development of performance and resource usage forecasting equations, and a model for analyzing computer performance and resource allocation, of computer systems using VM/370.

Master of Science in
Computer Science
December 1981

Advisor: N. F. Schneidewind
Department of
Administrative Sciences

Master of Science in
Information Systems
December 1981

SPECIFICATIONS OF A SIMULATION MODEL FOR A LOCAL AREA NETWORK DESIGN
IN SUPPORT OF STOCK POINT LOGISTICS INTEGRATED
COMMUNICATIONS ENVIRONMENT (SPLICE)

Ioannis Th. Mastrocostopoulos
Major, Hellenic Army
B.S.E.E., Naval Postgraduate School, 1982

This thesis gives the specifications of a simulation model for a particular Local Area Network (LAN) system which implements functions of the Stock Point Logistics Integrated Communications Environment (SPLICE). First, system simulation and LAN components and performance measures are discussed in general. Then, the components of a LAN system model employing bus architecture are identified and modeled as an open network of queues.

Master of Science in
Computer Science
October 1982

Advisor: N. F. Schneidewind
Department of
Computer Science

OPTIMISTIC CONCURRENCY CONTROL FOR DISTRIBUTED DATABASES

William Peyton McElyea
Major, United States Marine Corps
B.A., Brown University, 1968

One of the most important considerations in developing a distributed database system is the concurrency control mechanism. Recently, many arguments have been advanced in favor of the optimistic solution to concurrency control. This work reviews two algorithms that apply the King-Robinson proposal to a distributed database system. A different algorithm originally proposed by Badal is developed and expanded. This new algorithm switches from an optimistic mode of detecting and resolving non-serializable execution to a pessimistic mode of preventing non-serializable execution when the degree of conflict reaches a certain level. In other words, the algorithm adapts itself to the degree of conflict. Representative optimistic algorithms are then compared with two-phase locking and two-phase commit under different scenarios. Conclusions are drawn based on the performance of the algorithms under the different scenarios. The new algorithm appears to perform better than any of the concurrency control mechanisms.

Master of Science in
Computer Science
June 1982

Advisor: D. Z. Badal
Department of
Computer Science

THE PRELIMINARY PERSONNEL DATA BASE DESIGN FOR THE INDONESIAN NAVY

Moedjiono
Captain, Indonesian Navy

Currently the Indonesian Navy Computer Center (Dispullahtal) has a need for a Personnel Data Base System which satisfies all of the required applications. By analyzing the aspects of the personnel management in the Navy and the functions required to implement the management policies, the author has determined the data elements' relationships. Further, from the data elements' relationships and using logical Data Base model design methods, the author has derived a Personnel Data Base model. Topics discussed include: transformations of data elements between their logical views and physical representation, security, Data Base dictionary structure and characteristics, journalizing transactions to facilitate Data Base recovery, and Data Base administration. The author's efforts indicate that the Personnel Data Base presented herein is worthwhile and should be implemented. This involves the organization and formation of a Data Base Administration, and continuation and completion of the design.

Master of Science in
Computer Science
June 1982

Advisor: N. F. Schneidewind
Department of
Computer Science

DEVELOPMENT OF A CONCURRENT TREE SEARCH PROGRAM

Curt Nelson Powley
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Search, especially tree search, is fundamental to the field of artificial intelligence. Even with good heuristic functions, the time it takes on a single processor to solve progressively more difficult tree search problems grows exponentially and quickly becomes constraining. It seems reasonable that the use of concurrency should significantly improve the speed of a tree search. After discussing concurrent programming issues as background, this thesis outlines some high-level approaches to concurrent tree search. Development of each high-level approach includes development of required operating system interfaces. With the warning that choosing the best approach requires empirical evaluation, a concurrent tree search algorithm for the eight-puzzle is presented.

Master of Science in
Computer Science
October 1982

Advisor: D. R. Smith
Department of
Computer Science

COMPARISON OF MICROPROCESSOR BASED DATA BASE MANAGEMENT SYSTEMS

Richard Relue
Lieutenant Commander, United States Navy
B.S., Florida Institute of Technology, 1972

In this report two leading DBMS designs (DBASE II and MDBS III) are evaluated in terms of their design and performance on Altos computer systems. In addition some comments are made on their relative advantages and disadvantages for the average user.

The basic conclusions reached are that the relational design of DBASE II is easier to use and apparently performs data manipulation problems better than MDBS III. In large scale applications where reliability and security are imperative, MDBS III is more appropriate since it provides crash recovery, access control, integrity constraints and other key features which DBASE II lacks.

Master of Science in
Computer Science
June 1982

Advisor: D. Badal
Department of
Computer Science

A DISTRIBUTED NETWORK SUPPORTING
OCEAN SURVEILLANCE

Stavros Vassiliou
Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1965

This thesis demonstrates the improvements in computational efficiency, expandability, flexibility and cost than can be achieved in the solution of the Ocean Surveillance problem by the use of recently introduced technology. A preliminary design of the surveillance portion of a conceptual model of a fault tolerant distributed Command, Control and Communications system is carried out. The proposed system consists of a long haul fiber-optic ring network. Each one of its nodes has a similar multicomputer architecture for the manipulation of data collected by a variety of detection sensors. The performance prediction of the proposed model is included as well.

Master of Science in
Computer Science
October 1982

Advisor: U. R. Kodres
Department of
Computer Science

MASTER OF SCIENCE
IN
ELECTRICAL ENGINEERING

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MEASURED PERFORMANCE OF A DELAY LOCK TRACKING LOOP
WHEN NOISE POWER EXCEEDS SIGNAL POWER

Joseph Michael Hanratty
Captain, United States Army
B.S., United States Military Academy, 1972
M.S.S.M., University of Southern California, 1980

In the communications area there is a general interest in recovering signals which are below the noise level. In the military this interest translates to low-probability-intercept (LPI) and anti-jam (AJ) communications systems. The receiver improves the signal-to-noise ratio so data can be reliably recovered. This improvement is usually accomplished by matched filtering or by correlation.

In this report correlation is used as a post-detection processing technique to derive a synchronous reference. The system considered in this experiment can operate noncoherently by means of delay lock tracking loop at signal-to-noise ratios as small as -5.0 to -7.1 dB. Furthermore, synchronization is achieved while the received signal is being modulated by data. No preamble or other type of synchronization is required.

Master of Science in
Electrical Engineering
March 1982

Advisor: G. A. Myers
Department of
Electrical Engineering

A DISTRIBUTED ROUTING PROTOCOL FOR A PACKET RADIO NETWORK

Robert Heritsch
Major, United States Army
B.S., University of Wisconsin-Milwaukee, 1969

Packet Radio is a digital communications concept which offers the user the capability to pass voice and other data traffic in a radio network which may link high power computers with small mobile radios containing microprocessors. The technique of routing digital traffic from source to destination depends on the operational requirements of the network. Most routing concepts today centralize network control (in varying degrees) for normal operations. This thesis describes a concept for completely decentralized control of a packet radio network. The basic protocol is relatively simple and robust, but suffers from the usual build-up of overhead traffic with network size. Another related routing protocol is proposed which, under certain operational situations, reduces routing traffic and memory requirements compared to the basic algorithm. A concept for use of alternate links in the event of a broken link is also suggested.

Master of Science in
Electrical Engineering
March 1982

Advisor: J. Wozencraft
Department of
Electrical Engineering

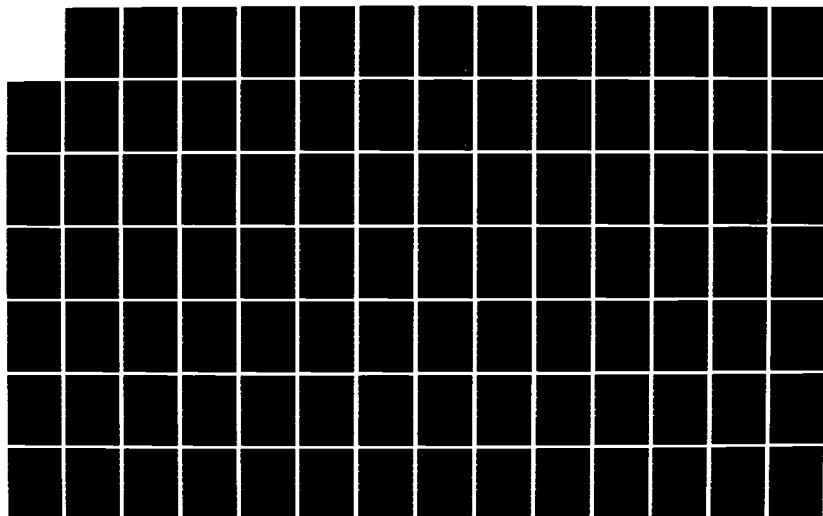
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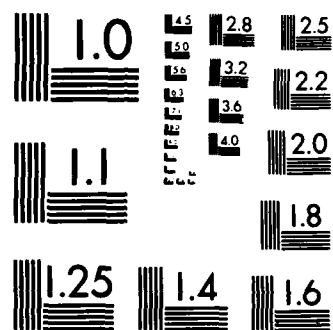
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APPLICATION OF COMPUTER MODELING TO THE STUDY OF THE
THERMODYNAMIC FORCES ACTING ON A BUILDING

Peter J. Ibert
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

The object of this research was to model an actual structure, Bullard Hall, in order to devise a more energy efficient means to control the internal temperature of that structure. The research included a study of all major thermodynamic forces acting on the structure, including solar radiation. Once the model was developed it was compared with the actual structure to determine its usefulness.

Master of Science in
Electrical Engineering
June 1982

Advisor: H. A. Titus
Department of
Electrical Engineering

AN APPLICATION OF KALMAN FILTERING AND
SMOOTHING TO TORPEDO TRACKING

Mustafa Isik
Lieutenant Junior Grade, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1982

A sequential Extended Kalman Filter and Smoothing routine was developed to provide real time estimates of torpedo position and depth on the three dimensional underwater tracking range at the Naval Torpedo Station, Keyport, Washington. Inputs to the routine were acoustic pulse transit times from the target to receiving array elements which are non-linear functions of the position coordinates. These inputs were linearized and the filter gains and filtered estimates calculated on-line. By using a smoothing subroutine, all past filtered estimates were smoothed. Tests were conducted using simulated torpedo trajectories that traversed multiple hydrophone arrays. It was found that filter performance was dependent on system noise and the distance the torpedo was from the hydrophone array and the smoothed estimates of states were better than or equal to the filtered estimates.

Master of Science in
Electrical Engineering
October 1982

Advisor: H. A. Titus
Department of
Electrical Engineering

DESIGN AND OPERATION OF A SIMPLE CIRCUIT USEFUL AS A MODULATOR TO
GENERATE ARBITRARY COMPOSITE ASK AND PSK CARRIERS

Allan M. Maughan
Major, United States Army
B.S., New Mexico State University, 1967

In radio transmission of binary data, it is often desirable to conserve bandwidth at the expense of signal power. To reduce carrier bandwidth (switching rate), M bits are used to change a parameter of the carrier, so the carrier has 2^M discrete combinations of amplitude, frequency, or phase. A common form of M -ary data transmission is composite amplitude shift keying (ASK) and phase shift keying (PSK).

This report considers a simple circuit which can be used to generate any arbitrary composite ASK and PSK carrier. Circuit operation is described and measured performance presented. To determine the noise behavior of particular types of composite ASK and PSK, a demodulator and error counter was built and used. Results are presented as curves of probability of error as a function of demodulator input signal to noise ratio.

Master of Science in
Electrical Engineering
June 1982

Advisor: G. A. Myers
Department of
Electrical Engineering

MISSILE MISDISTANCE REDUCTION: AN INSTRUCTIVE METHODOLOGY
FOR DEVELOPING TERMINAL GUIDANCE CONTROL SYSTEMS
TO MINIMIZE MISSILE MISDISTANCE

Gregory George Voulgarakis
Lieutenant, Hellenic Navy
B.S., Naval Postgraduate School, 1980

The present thesis is an instructive methodology for developing and improving guidance control systems, in order to minimize the missile misdistance. The complexity of the system which is under development depends heavily upon the defined assumptions, scenarios, specifications, current technology and cost effectiveness. It depends on the designer or the expert, to weigh up the advantages and disadvantages of all the above, according to their availability, for obtaining best results.

Master of Science in
Electrical Engineering
October 1982

Advisor: D. J. Collins
Department of
Aeronautical Engineering

Master of Science in
Aeronautical Engineering
October 1982

MASTER OF SCIENCE
IN
ENGINEERING ACOUSTICS

MEASUREMENTS OF THE HORIZONTAL DIRECTIONALITY
OF THE AMBIENT ACOUSTIC NOISE IN
MONTEREY BAY, CALIFORNIA

Michael Joseph Gagliardi
Lieutenant, United States Navy
B.A., University of Rochester, 1975

Measurements of some of the horizontal characteristics for acoustic ambient noise were carried out in the south-eastern parts of Monterey Bay, California, at a limited number of stations and for a limited number of ambient conditions. Directional hydrophones on bouys located at ranges of two to four miles from shore were used which have a steerable, cardioid-shaped pattern. The beam was successively aimed along the four cardinal directions and the frequency spectrum of the output was obtained. The frequency range of the system response was from 10 to 2500 Hz. Results are presented in the form of differences between the spectral energy bins in each direction and the average over all directions. Experimental difficulties with sonobouy reliability prevented collection of extensive data. Some tentative conclusions are drawn from the results.

Master of Science in
Engineering Acoustics
March 1982

Advisor: O. B. Wilson, Jr.
Department of
Physics

TWO-PHASE LAMINAR BOUNDARY LAYER FLOW AROUND A WEDGE

Dirk van Dord
Lieutenant Commander, Royal Netherlands Navy

This thesis theoretically presents the phenomena involved in the flow of an incompressible fluid over a wedge with a second incompressible, lighter, and less viscous fluid blown through the surface of the wedge. A method is developed to determine the inner fluid layer thickness, the wall shear stress and the resulting local drag reduction. The results predict substantial drag reduction.

Master of Science in
Engineering Acoustics
June 1982

Advisor: J. V. Sanders
Department of
Physics

MASTER OF SCIENCE

IN

ENGINEERING SCIENCE

LOW FREQUENCY GEOMAGNETIC FLUCTUATIONS (0.025 to 20 Hz)
ON THE FLOOR OF MONTEREY BAY

Morgan P. Ames, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

Louis M. Vehslage
Lieutenant, United States Navy
B.A., Ohio State University, 1975

Two coil antennas consisting of 5460 turns of copper wire were utilized to measure the vertical component and a horizontal component of the fluctuations of the geomagnetic field on the floor of Monterey Bay at a depth of approximately seventy meters. The results indicate that the power spectral density of the fluctuations varies from 1.6×10^3 nT²/Hz at 0.01 Hz to 8×10^{-8} nT²/Hz at 20 Hz for the horizontal component and from 3.2×10^2 nT²/Hz at 0.01 Hz to 6.3×10^{-6} nT²/Hz at 20 Hz for the vertical. Both components exhibit a monotonic decrease of about 20 dB/decade as the frequency increases, except in the 8-20 Hz region in which the Schumann resonances occur. Measurements of the power spectral density for the vertical component show relatively small excursions from average measurements as a function of wave action, while the horizontal power spectral density varies greatly throughout the day and as a function of seawater motion.

Master of Science in
Engineering Science
December 1981

Advisor: O. Heinz
Department of
Physics

AERODYNAMICALLY EFFICIENT GRADIENT REFRACTIVE INDEX MISSILE SEEKER LENS

Herbert M. Carr III
Captain, United States Army
B.S., University of Texas, 1971

This thesis explores the use of a pointed seeker lens designed using a spherically symmetric gradient refractive index (GRIN). The design helps to solve the current design conflict between optical quality and aerodynamic drag inherent in hemispherical seeker lenses. Equations for lens design and the evaluation of off-axis lens performance have been developed for both a homogeneous version and a GRIN version of the pointed seeker lens. The homogenous lens is used as a comparison and a check for the GRIN lens. A FORTRAN program (GISL) has been written and employed to evaluate and compare both the homogeneous lens and many different configurations of possible GRIN lens designs. Results indicate that the GRIN lens has highly superior off-axis imaging performance as compared to the homogeneous lens. The best results were obtained for the GRIN lens with fifty percent, positive, spherically symmetric gradient index with center of symmetry interior to the lens. Only very slightly inferior performance was observed with a five percent version of the same lens; such a lens possibly can be manufactured today. GRIN lens performance also indicates that for objects off-axis by more than 17.2 degrees a large scale, multiple element sensor array may be required; with such a sensor array, objects off-axis by more than 37.2 degrees may require mirror elements to compensate for image movement.

Master of Science in
Engineering Science
October 1982

Advisor: A. E. Fuhs
Department of
Aeronautics

HOLOGRAPHIC INVESTIGATION OF SOLID PROPELLANT PARTICULATES

Thomas R. Gillespie
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

This investigation completed the development process to establish a technique to obtain holographic recordings of particulate behavior during the combustion process of solid propellants in a two-dimensional rocket motor. Holographic and photographic recordings were taken in a cross-flow environment using various compositions of metallized propellants. The reconstructed holograms are used to provide data on the behavior of aluminum/aluminum oxide particulates in a steady state combustion environment as a function of the initial aluminum size cast into the propellant.

High speed, high resolution motion pictures were taken to compare the cinematic data with that available from the holograms.

Master of Science in
Engineering Science
December 1981

Advisor: D. W. Netzer
Department of
Aeronautical Engineering

CREATION OF A TRANSPORTABLE INTERACTION USER INTERFACE FOR
IMPROVED AAA SIMULATION COMPUTER PROGRAM (P001)

Eric R. Johns
Lieutenant, United States Navy
B.S.S.E., United States Naval Academy, 1975

The Air Force Armament Laboratory AAA Simulation Computer Program and MICE II have been adapted for batch processing use on the Naval Postgraduate School IBM 3033 computer. To ease data entry and reduce errors, a preprocessor program (PIP) was written at the school. The modifications necessary to convert PIP from a batch program to an interactive one are described herein.

This conversion to an interactive program has two goals: graphics capability and portability. The revised versions are designed in a manner that allows users to modify routines to meet their particular hardware and software. The graphics capability implements PIP using TEKTRONIX 4010 family hardware and PLOT-10 software. Derivative versions implement the program using the IBM 3277 graphics system and using strictly keyboard versions. In addition to PIP, a program for graphic design of scenario maps was developed.

Master of Science in
Engineering Science
June 1982

Advisor: R. E. Ball
Department of
Aeronautics

A LABORATORY EVALUATION OF THE SUITABILITY OF A XENON
FLASHTUBE SIGNAL AS AN AID-TO-NAVIGATION

Donald Francis Murphy
Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1966

Single flick xenon flashtubes have periodically been used by the U.S. Coast Guard as visual signals on marine aids-to-navigation. Their deployment has met with mixed responses. The conspicuity of the signal is excellent; it stands out among other visual signals, both flashing and steady lights. However, the flick is apparently too short, approximately 100 μ sec, for the mariner to fixate on it. He, therefore, is unable to make an accurate judgement concerning the distance to the light. This thesis utilized a Howard-Dolman Box to examine the depth perception of subjects under various flashing light conditions. Ten subjects qualified for the experiment and were trained. The subjects were then presented single and multi-flick flashtube bursts in an effort to determine which signal(s) provided depth perception that was comparable to that of a flashing incandescent aid-to-navigation. No significant differences between the light sources were found. The lack of differences was attributed, in part, to the unreliability of the test.

Master of Science in
Engineering Science
December 1981

Advisor: W. F. Moroney
Department of
Operations Research

16-INCH GUN-LAUNCHED ANTI-SATELLITE WEAPON

Joseph John Natale
Lieutenant, United States Navy
B.A., University of California, Los Angeles, 1975

This thesis determines the feasibility of developing a 16-inch, gun-launched anti-satellite weapon. The general performance capability of rocket-and scramjet-boosted, gun-launched vehicles is examined with regards to propelling a miniature homing vehicle to a satellite intercept altitude. Rocket and scramjet boost vehicle performance is modeled and optimum trajectories are determined. A low gun elevation at launch and a pop-up maneuver are required to maximize the scramjet boost vehicle acceleration potential. The rocket boost vehicle is capable of intercepting a low altitude satellite without a pop-up maneuver from a gun elevation of 45 degrees. Both boost methods provide apogees consistent with the intercept of known Soviet Electronic Intelligence Ocean Reconnaissance satellites, EORSAT, and Radar Ocean Reconnaissance satellites, RORSAT.

Master of Science in
Engineering Science
June 1982

Advisor: A. E. Fuhs
Department of
Aeronautics

FLOW CONTROL ABOUT AN AIRBORNE LASER TURRET

Larry Ellis Penix
Lieutenant Commander, United States Navy
B.S., The Ohio State University, 1971

This thesis project is the latest in a series of experiments conducted at the Naval Postgraduate School to improve the air flow in which a laser beam propagates. The particular turret to be studied is currently employed on Airborne Laser Laboratory which is aboard the NKC-135 aircraft; a one-third scale model was constructed in the 5 x 5 foot wind tunnel. The objective is to decrease the optical path distortion and jitter resulting from turbulent flow in the aft hemisphere of the turret that houses the laser telescope.

Afterbody fairing and fuselage boundary layer suction were employed with porous material added when necessary to stabilize the air flow. Compared to previous tests, the fairing was considerably smaller. Further, asymmetric arrangements consisting of an offset fairing were tested. A test matrix was developed that varied the fairing and base suction positions. Minimum suction duct velocity required to obtain quiescent flow was determined in each case. The lowest minimum flow for any configuration was 0.36 for the one-half offset condition.

The concept of using afterbody suction as a means of providing flow control with a geometrically smaller fairing than previously tested has proven effective for incompressible flow at critical Reynolds Number and low velocity.

Master of Science in
Engineering Science
June 1982

Advisor: A. E. Fuhs
Department of
Aeronautics

A SENSITIVITY ANALYSIS OF THE KALMAN
FILTER AS APPLIED TO AN INERTIAL
NAVIGATION SYSTEM

Gary Glen Potter
Lieutenant Commander, United States Navy
B.S.E.E., University of Idaho, 1973

A tactical missile with mid-course requires the use of an Inertial Navigation System (INS). Steady-state Kalman Filters (SKF) used as estimators have been proposed for use in a Strapdown INS that is considered to be cheaper and easier to implement than a gimbaled INS.

This thesis further investigates the sensitivity of the SKF to inaccuracies in the filter parameters such as the dimensional stability derivatives. The analysis is expanded to explore the sensitivity of a system of higher dimension created by the augmentation of an additional state. The study has been performed by independently varying each of the filter parameters over a given range and noting the effect on the accuracy of the filter. One of the benefits of this analysis of the rms estimate errors to variations in the stability derivatives is that it reveals which derivatives need to be accurately determined to ensure stable flight.

Master of Science in
Engineering Science
June 1982

Advisor: D. J. Collins
Department of
Aeronautics

DYNAMIC STABILITY OF FLIGHT VEHICLES

Dimitrios Penagiotis Pouliezos
Lieutenant, Greek Navy
B.S.E.E., Naval Postgraduate School, 1981

This thesis presents an analytical treatment of the dynamics of the flight vehicle and might be used as a textbook for a Dynamic Stability and Control advanced class.

Concentration is given to derivation of equations of motion, investigation of particular modes of motion, stability derivatives, aerodynamic transfer functions and digital computer solutions.

Master of Science in
Engineering Science
June 1982

Advisor: D. M. Layton
Department of
Aeronautics

A STUDY OF THE EFFECT OF PROCESSING VARIABLES ON THE
MECHANICAL PROPERTIES OF 5-INCH CARTRIDGE CASES

Fatih Soyalp
Lieutenant Junior Grade, Turkish Navy
B.S., Naval Postgraduate School, 1982

The yield strength of 5 inch cartridge cases (1030 steel) has been previously shown to be dependent upon the preparation method used for the test samples. The samples prepared by a procedure used by the Navy were roll-strengthened and stress relieved and the samples prepared by an Army method were straightened and not stress relieved. The samples prepared by the Navy test method gave a relatively high yield strength compared to samples prepared by the Army method.

It is clear from this previous work that if yield strength is to be a satisfactory acceptance criterion, standard specimen preparation and mechanical test procedures are necessary. The aims of this current program have been to determine in detail the effect of different sample preparation procedures on the yield strength and to recommend a standard procedure.

In summary, it is found that stress relieving the roll-straightened specimens produces strain aging which results in an increased yield strength and a restoration of a distinct yield point. The Navy method will better represent the actual yield strength of the case if the stress relief treatment is omitted as no increase in yield strength was measured due to various straightening techniques.

Master of Science in
Engineering Science
October 1982

Advisor: K. D. Challenger
Department of
Mechanical Engineering

MASTER OF SCIENCE
IN
INFORMATION SYSTEMS

AUTOMATED DATA PROCESSING EQUIPMENT FOR THE
FLEET MARINE FORCE (ADPE-FMF)

David Russell Aday
Captain, United States Marine Corps
B.S., Auburn University, 1976

Merrill Lyman Pierce, Jr.
Captain, United States Marine Corps
B.S., The Citadel, 1976

The West Coast implementation of Automated Data Processing Equipment for the Fleet Marine Force (ADPE-FMF) was completed during calendar year 1981. Designed primarily as a Source Data Automation (SDA) device for the enhancement of Class I input, ADPE-FMF has provided the power of a minicomputer to the battalion/squadron commander. Although the Class I input requirement demands most of the computer's time, there can be much computer time available for the use of the commander should he desire to make that time available. In order to do this, the user must become a master of ADPE-FMF. The purpose of this study is to help the user to become more efficient by providing him with a compilation of pertinent materials from which to draw an operational handbook.

Master of Science in
Information Systems
June 1982

Advisor: N. R. Lyons
Department of
Administrative Sciences

SOFTWARE ENGINEERING BASICS: A PRIMER
FOR THE PROJECT MANAGER

Steven Patrick Artzer
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

Richard Alvin Neidrauer
Lieutenant, United States Navy
B.S. (Ed.), State College at Buffalo, 1971

A key to any software development project is the presence of technically proficient management. The discipline of Software Engineering offers many different tools and techniques to aid the project manager in the development of quality software. This thesis provides an overview of this discipline, including its goals and underlying theoretical concepts. A discussion of specific tools and techniques that are applicable throughout the life cycle is included. Recognizing that the maintainability of the software is a primary consideration of any development project, two methods of measuring software for this important attribute are examined. Among the conclusions is that there exists a need for further research necessary in order to validate the utility of the tools and techniques of Software Engineering in large scale applications.

Master of Science in
Information Systems
June 1982

Advisors: LCDR R. W. Modes
Department of
Computer Science

N. F. Schneidewind
Department of
Administrative Sciences

ADPE MAINTENANCE CONTRACTS IN THE MARINE CORPS

Bill R. Beauchamp
Captain, United States Marine Corps
B.S., Abilene Christian University, 1972

This thesis examines the background of ADPE maintenance and its application in the Government. The reasons for the changes within the computer hardware maintenance industry in the last decade are explored and their effects on the Federal Government presented. Three contracts currently in existence in the Government are presented and the performance of the maintenance vendors examined. The presentation of this data will provide insight to the reader in regard to different possibilities of hardware maintenance coverage available and tradeoffs that ADP managers must make in determining which coverage is best for their computer center.

Master of Science in
Information Systems
December 1981

Advisor: CDR M. L. Sneiderman
Department of
Administrative Sciences

FEATURE ANALYSIS OF COMPUTER AIDED DESIGN

Daniel J. Devescovi
Lieutenant Commander, Civil Engineer Corps,
United States Navy
B.E.E., Manhattan College, 1965

Computers in the architectural and engineering field have been used for many years. Recently, computers have been playing an increasing role in the design process itself through the development of computer aided design systems. The development of interactive computer graphics was a major contributor to the acceptance of the computer in assisting in the design process by the architectural and engineering community.

The emphasis is placed on the aspects of computer graphics interactive input devices, the requirement of complete geometric representation of objects and the corresponding data management problem. Computer aided design problems in reference to architectural and engineering design theory is discussed and a brief history of computer aided design with an overview of various systems is presented.

Master of Science in
Information Systems
December 1981

Advisor: N. R. Lyons
Department of
Administrative Sciences

REQUIREMENTS ANALYSIS FOR EFFECTIVE MANAGEMENT
INFORMATION SYSTEMS DESIGN:
A FRAMEWORK AND CASE STUDY

John Charles Gerhard, III
Lieutenant Commander, United States Navy
B.S., Cornell University, 1968

Many firms employ automated information processing systems as an aid to managerial decision making. Few information systems, however, fully achieve their intended goal. To improve the probability of creating an effective management information system, designers must first identify the relevant processes that require information support. To meet this need a decision-oriented approach to information requirements analysis is presented. Then the analytic framework is illustrated through a case study of an information system that is being developed within the Department of Defense.

Master of Science in
Information Systems
December 1981

Advisors: D. C. Boger
N. R. Lyons
Department of
Administrative Sciences

DYNAMIC PLANNING AND CONTROL OF SOFTWARE MAINTENANCE:
A FISCAL APPROACH

James F. Green
Lieutenant Commander, United States Navy
B.S., University of Utah, 1971

Brenda F. Selby
Lieutenant, United States Navy
B.S., Eastern Kentucky University, 1974

Until recently, much of the budget planning for software systems has been primarily targeted at costs incurred during the development phase. However, with increasing software system life span and complexity, maintenance costs have become a more prevalent concern. As a result of necessary corrections for design errors and evolutionary maintenance, post-delivery investment in software systems now requires a greater proportional share of the life-cycle costs. In this research, various methodologies and system factors relating to software cost accounting are reviewed with the intent of developing a cost control model for arriving at a well-structured view for the management of the maintenance strategy and a control concept for analyzing manloading requirements during the maintenance phase.

Master of Science in
Information Systems
December 1981

Advisors: L. A. Cox
Department of
Computer Science

D. C. Boger
Department of
Administrative Sciences

AUTOMATED DATA PROCESSING/SIMULATION REQUIREMENTS OF THE
MARINE CORPS TACTICAL SYSTEMS SUPPORT ACTIVITY

Nancy Jeanne Hackert
Major, United States Marine Corps
B.S., University of Maryland, 1969

With the emergence of increased numbers of communications, command and control systems, and the expanding dependence on automated systems, there exists within the Marine Corps a requirement to define and control tactical systems software as a configuration management item. The Marine Corps Tactical Systems Support Activity (MCTSSA), designated as the primary software support activity for these systems, must define and acquire the necessary automated data processing hardware to achieve this future state. In addition, MCTSSA's mission requires software maintenance and testing, requiring a simulation facility. Current and future demands for computer support far exceed MCTSSA's existing capacity. One solution to the simulation/testing facility requirements is the subject of research and this paper.

Master of Science in
Information Systems
October 1982

Advisor: N. Lyons
Department of
Administrative Sciences

A COMPUTER AIDED INSTRUCTION TUTORIAL FOR THE RAMTEK
9400 COLOR GRAPHICS DISPLAY SYSTEM AT THE
NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIFORNIA

John Robert Hayes
Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1971

John Carr Sherrard
Lieutenant Commander, United States Navy
B.S., Iowa State University, 1971

The objective of this thesis research was to create an embedded tutorial for the Ramtek 9400 Color Graphics Display System. An embedded tutorial is a self-paced Computer Aided Instruction (CAI) learning technique which is implemented on the actual equipment the subjects are learning to use. This technique has tremendous potential in helping the Department of Defense meet its goal of increased manpower effectiveness. The Tutorial should eliminate the necessity for each user to possess and master large quantities of often confusing documentation. It should also free members of the laboratory staff from repetitive teaching tasks, allowing them to provide more specialized consulting. Goals of good CAT system design and man-machine interface, and the design techniques actually used to implement the embedded Tutorial are discussed. Evaluations by faculty, staff, and students were performed to identify areas of improvement. A User's Manual and Software Maintenance Manual were also written to accompany the embedded Tutorial.

Master of Science in
Information Systems
December 1981

Advisor: G. A. Rahe
Department of
Computer Science

SUPPLY POINT LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT (SPLICE)
LOCAL AREA COMPUTER NETWORK DESIGN ISSUES FOR COMMUNICATIONS

Kenneth A. Inman, Jr.
Captain, United States Marine Corps
B.S., Oklahoma University, 1977

Robert C. Marthouse, Jr.
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1977

This thesis examines the topology and transmission mediums for a local computer network to support interconnection of heterogenous computing devices within the Supply Point Logistics Communications Environment (SPLICE). A topology and appropriate network protocols for management of the intranetwork communications are recommended. Additionally, a protocol to ensure proper delivery of messages which must pass outside the local network to reach another SPLICE configuration via an inter-connecting network is discussed.

Master of Science in
Information Systems
June 1982 (Inman)

Advisor: N. F. Schneidewind
Department of
Administrative Sciences

Master of Science in
Information Systems
October 1982 (Marthouse)

THE USE OF THE MARINE CORPS STANDARD ACCOUNTING, BUDGETING AND
REPORTING SYSTEM TO MEET DATA REQUIREMENTS OF THE
COMMERCIAL ACTIVITIES PROGRAM

Jack DeWayne Larson
Major, United States Marine Corps
B.S., University of Maryland, 1975

This thesis examines present methodology in the Marine Corps for obtaining data required in support of the Commercial Activities (CA) inventory report and the cost comparison analysis. It also presents a proposal for improving on present procedures by tasking the Marine Corps' Standard Accounting, Budgeting and Reporting System (SABRS) with meeting CA data requirements. In addition to an author-conducted survey of present procedures for CA data extraction, background information is provided on the CA Program. A discussion is also provided on the objectives, design characteristics, hardware configuration, and software capability of SABRS. The purpose of this discussion is to highlight capabilities and design characteristics that lend themselves to CA data requirements. System impact is presented in a separate chapter which is intended to serve as a working document in relating CA user needs to SABRS system designers. Conclusions and recommendations focus on specific managerial actions that the author feels are important to improving the efficiency and effectiveness of CA data extraction in the Marine Corps.

Master of Science in
Informations Systems
June 1982

Advisor: LCDR R. A. Bobulinski
Department of
Administrative Sciences

A MODEL FOR ESTIMATING TACTICAL SOFTWARE MAINTENANCE REQUIREMENTS

William H. Merring, III
Captain, United States Marine Corps
B.S.I.E., Rutgers University, 1976
M.S., University of Southern California, 1981

Recent studies have pointed to the increasing burden that is software maintenance. The maintenance of tactical systems software will demand resources that exceed those expended during the development phase as their numbers and time-in-service increase. This increased demand for resources requires more effective management of the maintenance phase and development of the software with maintenance in mind.

This thesis presents those items that should be considered and utilized during the development phase to reduce maintenance costs over the life-cycle of the system. It also presents a model that uses the known configuration of the program to estimate the maintenance personnel requirements for that system. These requirements will be estimated from the beginning of the maintenance phase to its completion. The model utilizes the technique of measuring the characteristics of the software to obtain the estimation.

Master of Science in
Informations Systems
June 1982

Advisors: D. C. Boger
Department of
Administrative Sciences

LCDR R. W. Modes
Department of
Computer Science

FEASIBILITY AND REQUIREMENTS ANALYSIS OF MIS FOR OPERATIONAL
PATROL SQUADRONS IN THE UNITED STATES NAVY

Carl P. Norton
Lieutenant, United States Navy
B.S., United States Naval Academy 1975

F. Michael Langley
Lieutenant, United States Navy
B.S., United States Naval Academy 1975

The feasibility of a computer based Information/Training Support System for Operational Patrol Squadrons is examined in detail. The historical development and evolutionary trends of such a system are reviewed, current initiatives and projects are explained and evaluated, and user requirements are analyzed in order to make recommendations for future development. The Aviation Training Support System (ATSS), Naval Aviation Logistics Command Management Information System (NALCOMIS), and proposed Portable Logistics System (PLS) are cited as possible developmental paths for future systems. These paths are evaluated in terms of Patrol Squadron requirements, and are presented, either singularly or in combination, as feasible alternatives. This thesis serves as a comprehensive reference for decision makers involved in systems development within the United States Navy Patrol Aviation Community.

Master of Science in
Information Systems
December 1981

Advisor: N. R. Lyons
Department of
Administrative Sciences

DATABASE AND TERMINAL MANAGEMENT FUNCTIONAL DESIGN SPECIFICATIONS
IN SUPPORT OF STOCK POINT LOGISTICS INTEGRATED
COMMUNICATION ENVIRONMENT (SPLICE)

Joseph N. Reinhart, III
Lieutenant, United States Marine Corps
B.S., U.S. Naval Academy, 1977

Ricardo Arana
Lieutenant, Peruvian Navy
B.S., Peruvian Naval Academy, 1973

As a result of the growing demands for Automated Data Processing at the Navy Stock Points and Inventory Control Points, long range plans are being developed around the Stock Point Logistics Interface Communications Environment (SPLICE) concept. This thesis examines the initial design and implementation of the SPLICE Local Area Network (LAN) as proposed by NAVSUP and FMSO, and provides an alternative design and implementation strategy. The alternative design and implementation strategy recommended by this thesis is designed to provide a fully distributed architecture for a Local Area Network and, in particular, the Terminal and Data Base Management components.

Master of Science in
Information Systems
June 1982

Advisor: N. F. Schneidewind
Department of
Administrative Sciences

A FUNCTIONAL COMPARISON OF THE NAVAL AVIATION LOGISTICS COMMAND
MANAGEMENT INFORMATION SYSTEM (NALCOMIS) AND THE
SHIPBOARD UNIFORM AUTOMATED DATA PROCESSING
SYSTEM-REAL TIME (SUADPS-RT)

Syd W. Rodenbarger
Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy, 1970

Two important Management Information Systems currently under development are the Naval Aviation Logistics Command Management Information System (NALCOMIS) and the Shipboard Uniform Automated Data Processing System-Real Time (SUADPS-RT). Both of these systems address the functions of aviation supply support afloat and are envisioned for implementation on replacement state-of-the-art hardware being procured under the Shipboard Non-Tactical ADP Program (SNAP). Both systems are being developed as on-line, real-time MISs designed to provide maintenance and material managers with information concerning the management of aviation maintenance and supply support. This thesis investigates these two systems and determines those functional areas where duplication exists. Recommendations concerning the incorporation of the functional differences of the two systems are also provided.

Master of Science in
Information Systems
June 1982

Advisor: N. Schneidewind
Department of
Administrative Sciences

UNITED STATES NAVY HELICOPTERS IN COMBAT SEARCH AND RESCUE

Dennis James Rowley
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

Research was conducted to examine the validity of the employment of U. S. Navy helicopters for the combat search and rescue (CSAR) mission. It is proposed that the Navy does not currently have the capability to conduct CSAR operations in an opposed environment with an acceptable loss rate. A mission description is offered including mission essentials, phases and profile. Current Battle Group helicopter assets are presented. Training and equipment shortfalls are noted. A discussion of resource management includes dollar, political and psychological costs. A proposal is offered to initiate a viable CSAR capability that recognizes the need for CSAR and makes its tactical development a matter of CNO policy, develops an appreciation for the fact that this is an TACAIR problem, and suggests a measured approach to solving the problem. Finally, a decision matrix is presented to assist the Battle Group Commander in the employment of his helicopter assets in the pursuit of a CSAR mission.

Master of Science in
Information Systems
June 1982

Advisor: R. Weissinger-Baylon
Department of
Administrative Sciences

PROJECTION OF MAXIMUM SOFTWARE MAINTENANCE MANNING LEVELS

Stephen L. Tody
Lieutenant Commander, United States Navy
B.S., Trinity College, 1970

Ray A. Hodgson
Captain, United States Army
B.S.I.T., Kansas State College, 1973

The apparent lack of management of software maintenance within DOD and throughout the software industry has given rise to concern, as the costs associated with software maintenance continue to increase. The major contributor to the rise in maintenance costs seems to be personnel costs as opposed to hardware acquisition or computer time. However, to-date, it appears that little research has been conducted to attempt to resolve this problem. There also appears to be a lack of any standard definition of software maintenance. This thesis discusses various models which have been developed to attempt to predict maintenance manloading as the controlling factor in maintenance costing. It evaluates one model in particular, and proposes a possible maintenance versus life cycle phase relationship which may be of assistance to the software manager in maintenance manloading prediction. It also proposes specific topics for further research in this area.

Master of Science in
Information Systems
June 1982

Advisor: LCDR R. W. Modes
Department of
Computer Science

D. C. Boger
Department of
Administrative Sciences

A MACRO APPROACH TO SOFTWARE RESOURCE
ESTIMATION AND LIFE CYCLE CONTROL

Blair Roland Vorgang
Captain, United States Marine Corps
B.S., United States Naval Academy, 1976

Planning and controlling the software development process has shown, in the past, to be an extremely difficult task. The estimation of resource requirements, development costs, risk profiles and project feasibility has often proven to be inaccurate, thus costing the government time and dollars. However, by using obtainable management parameters, and simple engineering and operations research techniques, estimating can be done easily and accurately by taking a macro approach to the estimation problem.

This study will present the background and mathematical basis for a software cost estimation model. In addition, an example of an automated application of the model will be presented and discussed.

Master of Science in
Information Systems
December 1981

Advisor: N. R. Lyons
Department of
Administrative Sciences

A HANDBOOK FOR AUTOMATIC DATA PROCESSING
EQUIPMENT ACQUISITION

Dorothy E. Walizer
Lieutenant, United States Navy
B.A., East Stroudsburg State College, 1974

Lois L. Gamboa
Lieutenant, United States Navy
B.S., Drexel University, 1975

Automatic Data Processing Equipment (ADPE) procurement by federal agencies is governed by an interlocking network of policies and directives issued by federal agencies, the Department of Defense (DOD), the Department of the Navy (DON), and local commands. This thesis is an attempt to collate all applicable directives concerning ADPE procurement and provide an easily read step by step guide. The handbook leads the reader through naval policies and directives, organized according to threshold prices for the desired acquisition. The impact of the General Service Administration (GSA), its policies and procedures are clearly indicated to allow the user to disregard these portions in the event congressional deliberation determines that DOD is not subject to the provisions of PL 89-306, Brooks Bill. Appendices include sample documentation; addresses; and applicable supporting documents.

Master of Science in
Information Systems
December 1981

Advisor: M. L. Sneiderman
Department of
Administrative Sciences

MASTER OF SCIENCE

IN

MANAGEMENT

A COMPARISON AND ANALYSIS OF ARMY
GENERALS AND EXECUTIVES

Andrew E. Adams
Captain, United States Army
B.S., Florida Southern College, 1973

Mark W. Boyer
Captain, United States Army
B.S., Kent State University, 1974

This research continues the study by Leshko and Vosseteig (1975) along with further research conducted by Rowe, Rudeen, and Wenke (1976) in the use of situational stimuli as an aid in identifying and measuring executive capacity. Hypothesis testing was conducted that used capacity indicators which had been previously identified and isolated. Conclusions to the earlier studies claim that an individual's response to the questionnaire can be used to predict the potential success or failure of that individual in an executive role. Whereas prior research deals with executives within the private sector, the data base used in this study was comprised of top military decision makers (O7 and above) from within the United States Army. The data from this study was compared with those responses from the previous studies. In addition, the data collected was used to present a profile of today's U.S. Army Generals.

Master of Science in
Management
December 1981

Advisors: R. A. McGonigal
J. W. Creighton
Department of
Administrative Sciences

AN ANALYSIS OF LOCAL DELIVERY COSTS AND TIMES AT NAVAL
SUPPLY CENTER OAKLAND, CALIFORNIA

Dennis G. Allion
Lieutenant Commander, Supply Corps, United States Navy
B.S., Michigan State University, 1971

John E. Tufts
Lieutenant Commander, Supply Corps, United States Navy
B.S., Oregon State University, 1971

This study is an analysis of the local delivery system at the Naval Supply Center Oakland, California. Specifically, the study provides information regarding the average costs of deliveries to various customer locations and how driver time is distributed between travel and non-travel functions. As a result of the study, the authors concluded that Naval Supply Center Oakland and Public Works Center San Francisco are more concerned with the effectiveness of the local delivery operation than with its efficiency. Accordingly, recommendations regarding modifications to the current local delivery operation are provided in an effort to more evenly balance the emphasis between the system's effectiveness and efficiency.

Master of Science in
Management
June 1982

Advisor: A. W. McMasters
Department of
Administrative Sciences

FEASIBILITY OF GATHERING DEPRECIATION INFORMATION
FROM EXISTING SOURCES FOR US ARMY INSTALLATION
ACCRUAL ACCOUNTING SYSTEMS

Robert Emerson Blackwood
Captain, United States Army
B.S., Southwest Missouri State University, 1973

This thesis examines the feasibility of gathering depreciation related information from existing sources for United States Army organization equipment. Ten sources are identified, and the amount and type of information each can supply is evaluated. Methods for estimating missing information are demonstrated and evaluated. The resources required to gather this information are estimated for the most promising sources. The primary conclusion reached is that all necessary information cannot be gathered. However, gathering existing information is feasible and useful. Fourteen recommendations are made concerning actions needed to prevent destruction of existing information, correct property accounting systems so that future information is recorded, and ensure that information sources can efficiently provide depreciation related information for equipment when depreciation systems are implemented.

Master of Science in
Management
December 1981

Advisor: J. M. Fremgen
Department of
Administrative Sciences

IMPROVING THE MANAGEMENT CONTROL OF AVIATION
FLEET MAINTENANCE FUNDS

William G. Bozin
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

Aviation fleet maintenance (AFM) funds are used to maintain and support the U.S. Navy's fleet of operational aircraft. Previous studies and AFM funds managers (Reily and Sheppard, 1980; Naval Audit Service, 1981; Needham, 1981) have expressed the opinion that the management of these funds can and should be improved. This thesis compares the current system of accounting and control to a model of management control developed in the thesis. The thesis presents specific recommendations for improving the management control of AFM funds in the areas of performance measurement and standard development, budgeting, information feedback, and responsibility accounting. Further, it suggests a refocusing of the present system from fiduciary accounting and control toward management control.

Master of Science in
Management
December 1981

Advisor: K. E. Euske
Department of
Administrative Sciences

A FULL OVERHEAD COST MODEL FOR THE
U.S. COAST GUARD YARD,
CURTIS BAY, MARYLAND

Michael F. Breen
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

This report examines the effect of including real property depreciation in the U.S. Coast Guard Yard's overhead costs. The following accounting concepts are discussed as to their nature and appropriateness to the Yard's accounting: asset valuation, useful life determination, depreciation and asset capitalization criteria. Two methods of overhead allocation are presented and contrasted. The first method is currently used by the Yard and the second is a proposed replacement. A \$1,000 capitalization threshold is proposed to replace the current \$200 threshold. The real property assets are depreciated on the basis of their historical cost and by the straight line method. Their depreciation costs are distributed to the appropriate cost centers. From there the costs are allocated to overhead by both allocation methods. The effect of a \$1,000 capitalization threshold is then added in to the calculations. A new rate structure is computed twice for both allocation methods: at the current capitalization threshold and at the \$1,000 capitalization threshold. The four resulting rates are applied to sample Yard projects to contrast their effects on overhead costs.

This report concludes that information based on historical cost is irrelevant due to inflation. A recommendation is made to use current cost, which would produce more useful information to determine the current operating costs of the Coast Guard Yard.

Master of Science in
Management
June 1982

Advisor: J. Fremgen
Department of
Administrative Sciences

AVIATION SQUADRON ORGANIZATION DEVELOPMENT OF THE NAVY'S
LIGHT AIRBORNE MULTI-PURPOSE SYSTEM (LAMPS) MK III

John Richard Bush
Lieutenant, United States Navy
B.A., Jacksonville University, 1975

This paper examines the evolution of the U.S. Navy's SH60-B, LAMPS Mk III aircraft and squadron methodology. It analyzes current HSL organization design and introduces alternative organization structures to support this new helicopter community when it is introduced in the fleet in 1983-84. It begins with a statement of the issue which includes a concise historical overview of the LAMPS program and discusses its tactical and support missions. It next examines the conventional naval air squadron organization methodology from which LAMPS squadrons are designed and manned. A statistical analysis of operational fleet HSL squadrons is presented which concludes that conventional squadron design methodology does not support the unique LAMPS community. Four general alternative organization models are proposed followed by a discussion of the possible utilization of the Naval Flight Officer in the LAMPS System. The paper concludes with a summary of the proposals from which organization redesign may result and offers recommendations to that process.

Master of Science in
Management
December 1981

Advisor: J. W. Creighton
Department of
Administrative Sciences

ENERGY FORECASTING MODELS WITHIN THE DEPARTMENT OF THE NAVY

Leslie W. Buttolph
Lieutenant Commander, United States Navy
B.S.E.E., Cleveland State University, 1969

Executive Order 12003 requires that all federal activities reduce their energy consumption by 20% from fiscal year 1975 use by fiscal year 1985. The Defense Energy Information System for shore activities (DEIS II) provides a system of measuring, reporting, and comparing energy use levels in pursuit of that goal.

The use of regression and time series models of energy use were examined for application within the present DEIS II system. A data base of monthly electricity use, gross floor areas, four weather variables, and building area category identification codes were used in a framework study of 12 Naval Regional Medical Centers. Specific methodologies for model development, interpretation, and application to a control system are demonstrated and discussed.

Master of Science in
Management
June 1982

Advisor: S. S. Liao
Department of
Administrative Sciences

SOCIOECONOMIC AND PERSONAL VARIABLES EFFECTING
RETENTION OF MEDICAL OFFICERS

Russell L. Cain
Lieutenant, Medical Service Corps, United States Navy
B.S., The George Washington University, 1978
M.A., Pepperdine University, 1980

The question of which factors influence career decision of medical officers in the military services provides the focus for this thesis. It addresses the question of how a myriad of socioeconomic and personal variables impact upon physician retention.

Cross tabulation, multiple regression, and discriminant analysis are utilized to do a quantitative examination of the potential motivational factors involved in making career decisions. Both financial incentives and job components are found to be important variables affecting career decisions of military physicians.

Master of Science in
Management
October 1982

Advisors: G. W. Thomas
D. Whipple
Department of
Administrative Sciences

A STUDY OF COMPARATIVE MANAGEMENT STYLES IN JAPAN AND KOREA

Kwang Sop Choe
Lieutenant Colonel, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1967

Korea's economic development within recent years has begun to attract the interest of Western economists with an enthusiasm similar to that heretofore shown the Japanese management style. Two countries that have similar characteristics such as overpopulation, poor resources, and Confucian tradition, might also have similar management styles. However, the behavior pattern of Korean businessmen has several characteristics which differ from their Japanese counterparts. Interestingly, many of these differences result from a dissimilar degree of Confucian influences. Accordingly, Korea has evolved its management system during a transition period influenced by traditional Confucianism, Japanese practices, and the American system. For the foreseeable future, the Korean business environment will consist of a management style which is oriented comparatively more Japanese, than American. This paper first overviews, then compares the management styles of Japan and Korea to better understand both systems.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
Department of
Administrative Sciences

ANALYSIS OF THE CRIMINAL JURY TRIAL SCHEDULING SYSTEM IN USE AT THE
MONTEREY BRANCH OF THE MONTEREY COUNTY,
CALIFORNIA, MUNICIPAL COURT

Michael James Clark
Captain, United States Army
B.A., Gonzaga University, 1976

This thesis is an analysis of the criminal jury trial scheduling system in use at the Monterey Branch of the Monterey County, California Municipal Court. Inefficiencies in the scheduling system which cause witnesses and jurors to incur additional costs are analyzed to identify areas which can be improved. The analysis covers a six-month period from January 1981 through June 1981. The estimated cost to the witnesses and jurors of the inefficiencies is \$83,519 for the six-month period. The author proposes three alternative policies for a revised scheduling system. The alternative policies are tested and evaluated for their effect on the court's operation using Monte Carlo simulation and sensitivity analysis. The author recommends that two of the three alternative policies, changing the timing of the readiness conference and establishing a minimum limit on the number of cases to be scheduled in each courtroom, be adopted by the Monterey Branch Municipal Court.

Master of Science in
Management
December 1981

Advisor: LCDR. R. A. Bobulinski
Department of
Administrative Sciences

QUALIFIED AIRCRAFT HANDLERS: A STUDY OF THE UTILIZATION
AND PLACEMENT OF TRAINED PERSONNEL IN
NAVAL AVIATION UNITS

Michael R. Clements
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

In many instances, the utilization of trained naval personnel outside their specialty is inevitable, and the resulting skill deterioration in that specialty and necessity for re-training is also inevitable. The unnecessary utilization of trained personnel out-of-rating, however, must be controlled to combat rising training costs and attain maximum possible training efficiency and trained manpower availability.

There is no single aviation rating that performs all the duties and tasks for which the Plane Captain branches of Line Divisions of naval aviation units are responsible. This thesis reviews the current methods utilized to man the Plane Captain branches of these Line Divisions, discusses the advantages and disadvantages, and reviews the alternatives to correct this manning dilemma that have been proposed to date. It then presents a new proposal to modify the current Line Division manning practices in order to decrease the utilization of trained personnel out-of-rating and improve the efficiency of the naval aviation maintenance work force.

Master of Science in
Management
December 1980

Advisor: R. S. Elster
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Administrative Sciences

AN ANALYSIS OF CONTRACTING OFFICER TECHNICAL
REPRESENTATIVE TRAINING REQUIREMENTS

Anthony Livingston Cole
Commander, United States Navy
B.A., University of South Florida, 1966

Joel Leon Biliouris
Lieutenant, United States Navy
B.S., Bryant College, 1973

The activities within the Navy Field Contracting System (NFCS) which exercise regional contracting management responsibilities are writing and administering an increasing number of services type contracts. These contracts require active participation in the contract administration function by the activities for which the contracts are written. The persons assigned the duty of representing the contracting officer and performing the technical liaison functions are usually called Contracting Officer Technical Representatives (COTRs). Since the environment COTRs must work in is often new and requires different knowledge and skills, the content and quality of training of these individuals is of significant importance. This research identifies the knowledge and skill requirements for COTRs, examines the assets currently in use to satisfy COTR training needs, and proposes a new approach to the structure and administration of COTR training. A modular structure using several presentation media is emphasized, and video sessions are featured. Examinations are also given.

Master of Science in
Management
June 1982

Advisors: CDR M. L. Sneiderman
J. W. Creighton
Department of
Administrative Sciences

TRAINING REQUIREMENTS DETERMINATION

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B.A., Texas Tech University, 1967

Richard Laurel Thomas
Lieutenant, United States Navy
B.S., Purdue University, 1975

Peter Bernt Opsal
Lieutenant, United States Navy
B.A., Saint Olaf College, 1973

This thesis describes the process that is currently utilized by the Navy in determining training requirements for initial skill ("A" School) and skill progression ("C" School) training. The thesis presents an overall view of the Department of Defense Planning, Programming and Budgeting System (DOD PPBS) and a more extensive look at the Navy Program Objectives Memorandum (POM) development process. The various offices, billets, and models which contribute to the development of the "A" and "C" School Input Plans are identified. The thesis provided a source document for the Training Requirements Determination course, which is a requirement for a Masters of Science degree in the Manpower, Personnel and Training Analysis curriculum at the Naval Postgraduate School.

Master of Science in
Management
December 1981

Advisor: R. S. Elster
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AN EXAMINATION OF THE EFFORT TO AUTOMATE THE PROCUREMENT
SYSTEM OF THE NAVY FIELD CONTRACTING SYSTEM

Theodore Alan Coyle
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B.S., United States Naval Academy, 1974

In 1974, the Naval Supply Systems Command initiated actions to automate the procurement process within the Navy Field Contracting System (NFCS). The development project was titled, Automation of Procurement and Accounting Data Entry (APADE). By 1979, the original project was discontinued and a redesign effort was initiated. In an effort to determine the underlying reasons for the project's delay and problems encountered in developing an Automated Data System (ADS), this thesis examines the APADE project. In addition to the reasons and problems addressed by the Naval Data Automation Command's evaluation report, the researcher concluded that the procurement procedures utilized by the NFCS activities were not defined nor standardized sufficiently to facilitate ADS development. Additionally, there was no indication that this situation was addressed or corrected during the planning phase of APADE II development. The researcher also concluded that various conditions significantly impacted upon the development process.

Master of Science in
Management
October 1982

Advisor: D. C. Boger
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Administrative Sciences

MANNING THE NUCLEAR SUBMARINE FORCE OF THE
1980's AND BEYOND: AN OFFICER STUDY

Gordon R. Dickens
Captain, Australian Regular Army
B.Ec., James Cook University of North Queensland, 1976

The Purpose of this thesis is to examine the demand for, and supply of, nuclear qualified submarine officers in the ranks LTJG to CDR during the 1980's and beyond. Four demand and six supply scenarios are developed and compared to give 24 possible patterns of projected officer shortages and surpluses over the years 1982 to 1997, and in steady state. The relative effectiveness of various accession and lateral entry policies is then examined in an attempt to identify an optimum accession and/or lateral entry program. Finally, the Navy's ability to meet the required accession goals is assessed by studying the projected supply of college graduates qualified to enter the nuclear submarine force.

The pattern of shortages and surpluses projected indicates that unless attrition rates can be reduced, it will not be possible to fully man the submarine force with nuclear qualified officers before 1993 without a policy of lateral entry, for example, nuclear engineers working in industry. In the long run, all shortages can be eliminated by a policy of increased accessions.

Master of Science in
Management
June 1982

Advisor: R. S. Elster
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Administrative Sciences

A MANPOWER MODEL TO DETERMINE FUTURE INPUTS
TO NEC 335X AND NEC 336X BILLETS

Lawrence K. C. Doong
Lieutenant, United States Navy
B.S., United States Naval Academy, 1976

This thesis develops a manpower model to determine future inputs of personnel to NEC 335X and 336X billets to support manning levels at 100% of authorized billets. The model utilizes cross sectional data, stocks and flows concepts, a Markov chain transition matrix, and derives future billet requirements in order to determine desired stock levels and input projections, by paygrade, up to 1990. By comparing billet requirements to on hand stocks in the out years, an analysis of personnel utilization reveals overmanning in the E6 paygrades for NEC 335X, and overmanning in the E7, E8, and E9 paygrades for NEC 336X. The analysis suggests a reassignment of junior billets to senior personnel or an increase of senior billet authorization. This model is applicable to virtually any rate, rating or NEC within the enlisted personnel structure.

Master of Science in
Management
December 1981

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Administrative Sciences

AN APPLE II IMPLEMENTATION OF THE MAN-MOD
MANPOWER PLANNING MODEL

James Lee Downs II
Lieutenant Commander, United States Navy
B.S.C., University of Louisville, 1965

This thesis presents an Apple II Markov Chain model software package programmed to be flexible, practical, and user interactive. The program addresses the future determination of manpower requirements by an application of a limited Markov chain model, a discrete time Markov process with a stochastic matrix of transition probabilities. The user may manipulate data inputs to vary outcome effects. The program was written in Applesoft, an Apple II basic language. It has the capability to store, retrieve, and modify data for use with the calculation procedures. The program can be modified or enhanced to allow for inclusion or utilization of other models.

Master of Science in
Management
March 1982

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Operations Research

AN ANALYSIS FOR CAPITAL EXPENDITURE DECISIONS
AT A NAVAL REGIONAL MEDICAL CENTER

Martin Edward Doyle III
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B.S., United States Naval Academy, 1970

This thesis addresses the problem encountered by non-profit medical centers in formulating budgets for capital expenditure decisions. Using Naval Regional Medical Center (NRMC) San Diego as an example a benefit/cost model was developed. The costs used in the authors analysis were those that were considered to be relevant and incremental. The benefits derived were a composite weighting of four factors determined from a survey of the chiefs of service at NRMC San Diego. These four factors are utilization rate of equipment, life-saving potential, greater dependability of service and better diagnosis and evaluation of patient needs. The composite rating was then extended over the estimated economic life of the equipment and divided by the net cost to determine an index of service. Finally, equipment proposals were ranked by index of service. This model was determined by the author and senior hospital administrators to be very useful in tentative ranking of equipment proposals.

Master of Science in
Management
December 1981

Advisor: LCDR R. A. Bobulinski
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Administrative Sciences

AN ORGANIZATION DEVELOPMENT APPROACH TO
TECHNOLOGY TRANSFER IN THE
NATIONAL FOREST SERVICE

Edward Paul Dulude
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B.S., George Washington University, 1976

Michael Martin Loessin
Lieutenant Commander, United States Navy
B.A., University of Texas, 1970

Technology transfer efforts conducted by the National Forest Service since 1972 provide the base for this work. Problem areas, as identified by the Forest Service, include an inability to acceptably institutionalize technology transfer processes throughout its system and a concomitant hesitancy for technology transfer processing to become an integral part of daily operations.

The problems are examined, using an organization development approach, by applying a model which breaks down the Forest Service organization into several major subcomponents. The subcomponents comprising the model are: People, Structure, Technology, Communications, Tasks and Goals, and Environment. An analysis is then conducted to determine the measure of "fit" among the various subcomponents in terms of their contributions to or hindrance of the technology transfer effort.

The conclusion identifies perceived weaknesses in the subcomponents of Structure and Communications, and a recommendation is proposed identifying a method of establishing a more viable communication/responsibility network through which technology transfer processes may flow.

Master of Science in
Management
September 1981 (Dulude)

Advisor: J. W. Creighton
Department of
Administrative Sciences

Master of Science in
Management
December 1981 (Loessin)

AN ANALYSIS OF COST GROWTH IN THE F/A-18
AIRPLANE ACQUISITION PROGRAM

Joseph Wendell Dyer
Lieutenant Commander, United States Navy
B.S., North Carolina State University, 1969

This research analyzes the F/A-18 airplane acquisition program with respect to cost growth. It is noted that the development estimate of total program cost addressed the acquisition of only 800 airplanes, but that a decision was made in 1978 to increase the inventory objective to 1366 airplanes. Additionally, the estimates of inflation (escalation) issued by the Office of the Secretary of Defense are observed to be lower than the inflation actually experienced by the F/A-18 contractors. It is concluded that, as of December 1980, the program cost growth was only 10 percent when adjustments are made for both the quantity change and for actual inflation. It is further concluded that the program managers had little control over cost growth. Continued inflation and possible failure to realize the expected cost-quantity relationships are identified as likely areas of significant future cost growth.

Master of Science in
Management
December 1981

Advisor: R. G. Nickerson
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Administrative Sciences

AN ANALYSIS OF THE ACQUISITION PROCESS
AT THE END OF THE FISCAL YEAR

Melda F. G. Dyer
B.S., University of West Florida, 1970

Each year over one hundred billion dollars is spent by the federal government to acquire needed goods and services. Of those funds the largest quarterly amount obligated occurs during the last quarter of the fiscal year. This thesis addresses the question of what the Department of Defense contracting officer can do within existing guidelines to facilitate the acquisition of needed items and services at the end of the year. This thesis analyzes year end spending at selected commands within the Department of Defense. The commands included are a supply center, two research facilities, two training facilities, and one operational air facility. Practical suggestions are offered and recommendations are made for managing the process to insure the effective and efficient use of funds. *Specific recommendations address:* complexity of acquisition guidance, use of requisition priorities, procurement planning, reinforcing employee behavior, and the need for and use of acquisition support equipment.

Master of Science in
Management
December 1981

Advisor: CDR M. L. Sneiderman
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INTERNAL AUDITING TECHNIQUES UTILIZED AT THE COUNTY
AND MUNICIPAL LEVEL OF GOVERNMENT
IN THE STATE OF CALIFORNIA

James M. Dykes
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This thesis presents an analysis of Internal Auditing at the County and Municipal levels of government in the State of California. Specifically, the research addresses the degree of local government's compliance with the expanded scope audit standards issued by the United States General Accounting Office (GAO) in 1972 and revised in 1981. The research encompasses specific aspects of the organization and independence, the professional skills, the audit performance and the reporting procedures of local level government audit offices. The information relevant to these areas was gathered by an author developed questionnaire. The response data provided is used to assess the degree of compliance with the GAO Standards and also to ascertain, if applicable, why local governments do not comply with these procedures. Conclusions and recommendations pertaining to this objective, as well as to the potential growth and development of internal auditing, are also provided.

Master of Science in
Management
June 1982

Advisor: LCDR R. A. Bobulinski
Department of
Administrative Sciences

SUBMARINE TENDER SHIPBOARD UNIFORM AUTOMATED DATA PROCESSING
SYSTEM REQUISITION/ISSUE/RECEIPT DOCUMENT PROCESSING
ERRORS, OMISSIONS AND PROCEDURAL DEVIATIONS

Glenn D. Eberling
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B.S., The Citadel, 1973

The Shipboard Uniform Automated Data Processing System (SUADPS) was designed in the late 1960's to improve afloat supply management by utilizing automated data processing equipment. This system is still currently operational on the U.S. Navy's thirteen submarine tenders performing most of the basic clerical functions of supply. SUADPS in its present form is obsolete and requires substantial manual interfacing from initial document preparation to final processing and filing. Some of the adverse aspects of SUADPS manual interfacing are document processing errors, omissions and procedural deviations. If not adequately curbed, these aspects can degrade submarine tender supply effectiveness. Within a few years, system improvements will be made available to the fleet to alleviate some of the deficiencies incorporated in the present system. Recommendations for measures to combat the spectrum of SUADPS document processing errors, omissions and procedural deviations are included in this thesis.

Master of Science in
Management
June 1982

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AN ANALYSIS OF MATERIAL DISTRIBUTION FROM
NSC SAN DIEGO TO LOCAL CUSTOMERS

Jeffrey M. Eller
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B.B.A., Lamar University, 1971

Robert T. Moore III
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of Washington, 1971

On 1 October 1980 the wholesale support function of the Naval Air Station, North Island (NASNI) was consolidated with that of the Naval Supply Center, San Diego (NSCSD) according to the DOD Material Distribution Study and the Shore Establishment Realignment Program (SER V). If the consolidation is to be judged as a success, NSCSD must offer improved post-consolidation support to its local customers, especially the Naval Air Rework Facility (NARF) at NASNI. This thesis offers a general discussion and documentation of the pre-SER NSCSD local delivery system in order to form a baseline from which to measure future system performance and effectiveness. It specifically addresses NSCSD's local delivery organization, facilities, and resources, plus the identification of the local customer base and the volume of business they generate.

Master of Science in
Management
September 1981 (Eller)

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Master of Science in
Management
December 1981 (Moore)

MERIT PAY AS A MOTIVATOR IN THE FEDERAL SECTOR

James D. Engel
BSEE, University of Cincinnati, 1971

The Civil Service Reform Act of 1978 required the implementation of the Merit Pay System for a portion of the Federal civilian workforce as a means of increasing productivity through the use of monetary incentives. To test the validity of this concept, several theories of worker motivation are reviewed and their relation to money motivation and pay-for-performance is established. These relationships are compared to the results of data gathered from 241 employees affected by the Act. The potential for success or failure of the Merit Pay System is discussed, indicating several problems with the program.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
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Administrative Sciences

SHIP'S FORCE OVERHAUL MANAGEMENT SYSTEM: AN EVALUATION
OF ITS EFFECTS ON SHIPBOARD AUTHORITY

David Arthur Evensen
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

The Ship's Force Overhaul Management System (SFOMS) is a management control system used on board U. S. Navy ships in overhaul. SFOMS is just one of the many components of the entire shipboard management system, and in order to be effective, SFOMS must balance, support, or complement all of the other system components. This research identified SFOMS's effect on the shipboard authority structures of a destroyer in overhaul and the resultant effect on SFOMS usage. SFOMS did increase in authority of upper level managers by providing them with a wider range of access to work information. This caused some lower level supervisors to adjust SFOMS information to prevent their seniors from exercising greater control over them.

Master of Science in
Management
October 1982

Advisors: K. J. Euske
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EXECUTIVE JOBS AND EXECUTIVE CONTINUITY: "AN INVESTIGATION WITH
SPECIAL REFERENCE TO SWISS ARMY INSTRUCTORS"

Robert Hans Feller
Major, G. S., Swiss Army

The purpose of this thesis is to explore the problems involved in the transfer of senior Swiss Army Instructors to civilian executive jobs in the Swiss Department of Defense and to help analyze means of enhancing this transfer. A survey with questions of an open-ended nature provides a wealth of ideas and opinions. It influenced the focus of the literature search and helped reconcile theory with practice.

The purpose and the functions of executives are discussed and four main concerns of executives are examined in more detail: leadership, decision-making, innovation and executive development. The discussions focus on those aspects which may be new to senior military instructors transferred to civilian executive jobs.

The issue of the development of executive potential in instructors is discussed in the concluding chapter. Sixty percent of the responses state a need for improved education, with the rationale that there is too great a difference between civilian and military problems and leadership. The objectives are defined, and possibilities for improvements are discussed. Three recommendations are given.

Master of Science in
Management
December 1981

Advisor: J. W. Creighton
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Administrative Sciences

PERFORMANCE EVALUATION METHODS FOR ARMY
FINANCE AND ACCOUNTING OFFICES

Albert M. Fleumer
Captain, United States Army
B.S., United States Military Academy, 1972

Michael B. Urrutia
Captain, United States Army
B.S., Georgia Institute of Technology, 1973

This thesis describes the Department of the Army (DA) Financial Management Quality Assurance Program, the Finance Information Network Evaluation System and the Finance and Accounting Monthly Operations Report System. Sample performance data from Finance and Accounting Offices (FAOs) are used to develop methodologies for identifying substandard performance; to determine the effect of the (DA) Quality Assurance assistance visits on FAO performance; and to develop a current profile of the performances of the various DA FAOs in regards to the Joint Uniform Military Pay System (JUMPS). Additionally, recommendations for improvement of the DA Financial Management Quality Assurance Program are presented. Two of these recommendations involve how to develop DA and major command historical performance standards, and ways to identify substandard performances by FAOs.

Master of Science in
Management
December 1981

Advisors: J. W. Creighton
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A COMPARISON OF MANNING OPTIONS FOR
THE AO-177 CLASS FLEET OILER

Jeffrey Lee Flood
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B.S., United States Merchant Marine Academy, 1971

This study develops comparative life cycle costs for the Navy military and Navy military-conversion to civil service manning options for the AO-177 class fleet oiler. These life cycle costs were derived by discounting the total annual cost elements of personnel, operations, and maintenance over thirty years using mid-year discount factors corresponding to a ten percent discount rate. In addition to the life cycle cost analysis, the non-quantifiable factors of Navy fleet oiler force level requirements, the expected recruiting environment in the 1980's and the requirement for a training platform for the multi-product AOE/AOR replenishment station ships were presented and discussed. Conclusions were drawn based upon the cost and non-quantifiable factor analysis and recommendations concerning the manning of the AO-177 class fleet oilers, future fleet oiler manning, and possible research were presented.

Master of Science in
Management
October 1982

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M. G. Sovereign
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Operations Research

ORGANIZATIONAL EFFECTIVENESS: A COMPARATIVE ANALYSIS BETWEEN
ARMY AND NAVY OFFICERS

Mark M. Gettys
Captain, Adjutant General's Corps
United States Army
B.A., University of Virginia, 1972

Arthur G. Maxwell, Jr.
Captain, Signal Corps United States Army
B.A., Presbyterian College, 1973

This study presents a comparative analysis of how four groups of officers view organizational effectiveness. The four groups that were surveyed include Human Resource Management Specialists (Navy), Organizational Effectiveness Management Consultants (Army), surface warfare officers (Navy), and combat arms officers (Army). The instrument used to collect the data was a modification of the Navy's Human Resource Management Survey (Fleet). The modification to the survey required these officers to describe organizational states which they believed were reflective of an "effective organization." The original Fleet survey merely asked officers to describe what their organizations looked like now, not how they believed they should look. Sixty of the original eighty-eight questions were modified from the Navy's survey. An additional forty questions were modified from Fleishman's leadership questionnaire. Comparative analyses were conducted among groups to determine if significant differences existed.

Master of Science in
Management
December 1981

Advisor: R. T. Harris
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AN APPROACH TO THE APPLICATION OF LIFE CYCLE COST
CONCEPT IN WEAPON SYSTEMS ACQUISITION FOR THE
VENEZUELAN NAVY

Jose G. Gil Rojas
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This thesis presents a review of the Life Cycle Cost (LCC) concept as it is applied in weapon systems acquisition. A methodology is developed for preparing estimates of the Support Investment (SI) and Operating and Support (O&S) costs of ship's acquisition programs. The use of cost models in LCC procurements is analyzed. Also, a methodology for implementation of Life Cycle Cost procurement within the Venezuelan Navy is presented. The study constitutes an attempt to introduce the Life Cycle Cost concept within the Venezuelan Navy, therefore the author has avoided indulgence into detailed subsystems, and has concentrated on the working and inter-relationships within an entire system.

Master of Science in
Management
December 1981

Advisor: J. W. Creighton
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MULTI-ATTRIBUTE UTILITY THEORY TO ASSIST
TOP-LEVEL ACQUISITION DECISION-MAKING

Ran Goren
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Top level acquisition decisions are complex and multi-objective. This implies difficulties in appropriately accounting for all relevant factors to select the best alternative. In addition, there are difficulties and deficiencies in the actual implementation of the decision process. The difficulties and deficiencies in the top-level acquisition decision-making are explored by this thesis. The thesis suggests improvements through intensive use of a quantitative, judgment-based decision technique derived from Multi-Attribute Utility Theory (MAUT). Emphasis is put on demonstrating MAUT's capability for incorporating subjective judgment, in order to reduce the existing doubts about its usefulness for top-level decision-making. The thesis recommends use of the MAUT procedure as the central tool for comprehensive evaluation of the decision alternatives. It argues that such use would solve some of the essential decision-making problems and in addition contribute to the quality and efficiency of the decision process.

Master of Science in
Management
December 1981

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CAREER ORIENTATIONS OF COAST GUARD AVIATORS

Dana Allen Goward
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B.S., United States Coast Guard Academy, 1974

Individuals within the same profession often have widely different career orientations. Some think of themselves mostly as professional specialists while others regard themselves as primarily members of the organization. The goal of this study was to examine the career orientations of Coast Guard pilots and the feasibility of establishing a limited duty officer (LDO) career path for aviators in which pilots would be assigned to flight duties for their entire twenty year career.

A conservative analysis of the data indicated that 19 to 20 percent of the total aviator population would be willing to participate in an LDO program. Willingness to participate in an LDO program was found to vary significantly with (1) how an individual identified himself as a pilot or an officer, (2) commissioning sources, (3) interest in becoming a unit instructor pilot, (4) perceived optimal tour length, and (5) rank.

Master of Science in
Management
December 1981

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THE AV-8B DECISION

Joel L. Goza
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B.S., The Pennsylvania State University, 1968

This thesis is a case study of the debate over the decision of the United States Government to procure the McDonnell Douglas AV-8B Advanced Harrier V/STOL jet aircraft for the U.S. Marine Corps. It includes a history of the development of the AV-8A Harrier, the development of the Marine Corps' concept of employment of V/STOL aircraft, and the development of the AV-8B. The study centers around the actions taken by the Office of the Secretary of Defense, the Department of the Navy, the U.S. Navy, the U.S. Marine Corps, and the Congress of the United States in the controversy over the AV-8B during the period 1977-1980. That controversy was over the decision to equip the Marine light attack force during the 1980's with either the AV-8B Advanced Harrier or the A-18 Hornet to replace worn-out A-4M Skyhawks and AV-8A Harriers. The thesis follows both sides of the argument over the AV-8B in the context of the PPBS process, the President's budget process, and the Major System Acquisition process.

Master of Science in
Management
June 1982

Advisor: F. M. Teti
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National Security Affairs

CAREER DEVELOPMENT OF THE MARINE CORPS OFFICER

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B.S., United States Naval Academy, 1971

The purpose of this thesis is to study the current state of officer career development in the U.S. Marine Corps and to discuss the importance of career development to both the Marine Corps and Marine officers.

Information which is of concern to the Marine Corps and the individual in developing officer career planning policies and individual strategies is presented. Current literature and studies dealing with military officer career development are discussed. Statistics on promotion opportunities based on analyses of the careers of the 65 generals on active duty in the Marine Corps as of February, 1981, are presented. Based on this data, guidance is provided on developing a career pattern for those seeking promotion to general officer rank.

Master of Science in
Management
December 1981

Advisor: R. A. Weitzman
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AN ORGANIZATIONAL BEHAVIOR VIEW OF DEPARTMENT
OF THE ARMY (DA) COMPTROLLERSHIP

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B.S., United States Military Academy, 1973

Kevin J. Kehoe
Captain, United States Army
B.S., State University of New York College of
Environmental Science and Forestry, Syracuse, N.Y., 1975

The purpose of the thesis is twofold: First, identify and rank in order of importance the specific organizational behavior deficiencies of junior level Department of the Army (DA) comptrollers and develop an addendum to a proposed practical comptrollership course (PCC) in order to alleviate the deficiencies. Second, test the validity of the Pledger (1980) comptrollership model for use within the DA. The Pledger comptrollership model is designed to aid comptrollers in analyzing their organizations in terms of technology and structure, leadership, and decision-making. Based on the analytical results the comptrollers could then take appropriate courses of action. Data obtained from a questionnaire sent to DA comptrollers verified the existence of deficiencies in eight major organizational behavior areas and the validity of the Pledger comptrollership model. Based on the data analysis the authors recommend that the DA should adopt and institute the 24 hour proposed PCC addendum and adopt the Pledger comptrollership model for use within the comptrollership community to facilitate the job orientation process.

Master of Science in
Management
December 1981

Advisor: K. Euske
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SOFTWARE QUALITY ASSURANCE AND THE FLEET
MATERIAL SUPPORT ENVIRONMENT

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B.S., United States Naval Academy, 1977

This thesis investigates the trends of thought and actual practices of commercial computer companies in the area of software quality assurance. This is done to see if any of these practices could be utilized in the Fleet Material Support Office (FMSO) environment. This was accomplished by personnel in a few randomly selected computer companies and comparing their quality assurance programs to that of FMSO. The following companies were selected:

1. International Business Machines (IBM) Corporation,
2. TRW Incorporated,
3. Hewlett Packard Company,
4. Amdahl Corporation,
5. Software Research Associates (SRA).

Results indicate that the greatest differences between the commercial world and the FMSO environment are in management's view of what role or function a quality assurance group should take, staff as compared to line, and this group's interface with the software design and development personnel.

Master of Science in
Management
June 1982

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COST ESTIMATION OF ARCHITECT & ENGINEER CONTRACTS

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Architectural and Engineering firms are selected for government projects via a technical competition method with a fair and reasonable fee determined through negotiations. The criteria for what is fair and reasonable is the government estimate. There is a limited guidance available on the preparation of estimates for A&E contracts. Additionally, there is limited use of empirical information due to the lack of an organized database. This research defined the cost estimation method as a decision process and supported that process with numerous analytical computations, statistical techniques, and regression cost models derived from a database comprised of previous A&E contract awards. This approach was effective in that estimates were generated which more closely represented negotiated fees.

Master of Science in
Management
December 1981

Advisor: S. S. Liao
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MANAGEMENT ADVISORY SERVICES BY CPA'S; A SURVEY OF
CURRENT EXPANSION OF SOLE PROPRIETOR
PROFESSIONAL PRACTICE UNITS

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B.S., School of Architecture, Ohio State University, 1973

This thesis is about Management Advisory Services (MAS) and issues associated with both current and future practice expansion efforts of sole proprietor Certified Public Accountant (CPA) firms. The sphere of MAS is described with emphasis placed on the CPA and his or her expanding role in delivery of professional management consultative services. A review of the MAS operating environment, various services, knowledge factors and internal CPA firm organizational aspects, provides a comparative basis for the reader's understanding of MAS pursuits by sole proprietor CPA practitioners.

The research was conducted through a survey and interviews with State of California CPA practitioners for the purpose of identifying practice trends and the professional's desire to expand current services. The survey results are presented relative to specific directions of MAS and a number of conclusions are made such as the need for firm specialization, client education, public advertizing and enhancement of knowledge skills and areas where more detailed study is required.

Master of Science in
Management
December 1981

Advisor: LCDR R. A. Bobulinski
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Administrative Sciences

IMPACT OF VHSIC TECHNOLOGY ON BATTLE
ZONE MATERIAL MANAGEMENT

Thomas Hewitt Hicks
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B.A., Alabama College, 1965

A new era in military microelectronics is unfolding. The Department of Defense, in 1979, initiated a six-year triservice Very High Speed Integrated Circuits (VHSIC) Program that will develop a new technology base for integrated circuits. This program has the potential of producing systems-on-a-chip capability. VHSIC, with its high density circuits, promises drastic reductions in size, weight, and power requirements, while still yielding higher levels of reliability and performance. The impact of this technology on systems capabilities and availability offers solutions to many logistics support problems. This thesis explores the impact of VHSIC technology on material management and logistics support in the battle zone of the future with a focus on maintenance and systems capabilities enhancement attributes and how they will facilitate the logistics process in the highly intensified combat promised for the future.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
Department of
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TRIDENT SUBMARINE LOGISTICS DATA SYSTEM (LDS):
A CASE STUDY IN LIFE CYCLE
MANAGEMENT AND BUDGETING

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B.S., State University of New York, 1973

As a method of controlling the rapidly rising costs and schedule delays plaguing software systems, Department of Defense (DOD) has implemented the concept of life cycle management for automated information systems (AIS). This thesis analyses the DOD life cycle management directives through the development of the TRIDENT Submarine Logistics Data System AIS. Specifically, it examines DOD software life cycle phasing and studies the cost and schedule variance guidelines established by the life cycle management directives. This thesis points out an apparent need for clarifying the DOD budget guidelines and a refining of the life cycle documentation requirements.

Master of Science in
Management
March 1982

Advisor: S. S. Liao
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Administrative Sciences

INTERGENERATIONAL OCCUPATIONAL INHERITANCE
IN THE DEPARTMENT OF DEFENSE

Joseph M. Hunt, Jr.
Captain, United States Army
B.S., Fairleigh Dickinson University, 1969

This thesis examined military service as an intergenerational occupation by determining the proportions of non-juniors, other juniors and career juniors in the Department of Defense in 1979. Immobility ratios were calculated for DoD and various subgroups based on rank, sex, race, and years of service to determine whether juniors are represented in the military in similar proportions to their composition in the population at large. Multiple Classification Analysis was used to test and analyze behavioral and socioeconomic differences among junior groups. Discriminant analysis was used to statistically distinguish among the three junior status categories and measure the success of correctly classifying officer and enlisted respondents in their appropriate junior group. Conclusions reached were, DoD exhibits strong intergenerational occupational inheritance tendencies when compared to most salary or wage earning civilian occupations: the three junior groups differ significantly in behavior and socioeconomic characteristics; junior status explains very little variation for the dependent variables examined after controlling for the effects of branch of service, sex, race and length of service.

Master of Science in
Management
March 1982

Advisors: G. W. Thomas
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Administrative Sciences

AN INVESTIGATION OF THE FEASIBILITY OF MANNING THE AIRWINGS
OF THE PROJECTED FY 1990 CARRIER FORCE

John J. Infield
Lieutenant, United States Navy
B.A., Glassboro State College, 1973

This thesis is a study of the feasibility of manning the airwings of a fifteen carrier force by FY 1990. An initial review of the history of the carrier force and the composition of its airwings and the manpower requirements needed to man them was accomplished. Manpower studies were conducted of the 131X/132X designators for officers and for eleven selected enlisted aviation ratings (AD, AE, AME, AMH, AMS, AO, AW, AT, AW, AX and PR). Specific predictive information used included personnel attrition, retention, promotion and accession data. All of this information was processed by an APL computer program designated MANMOD, which allowed projection of manpower requirements and personnel supply data forward to the year 1990. The MANMOD model permitted estimation of the accessions and retention requirements for the officer designators and enlisted ratings chosen for study. This projection of data provided predictions on whether current-day policies will meet future billet requirements or whether changes in policies will have to be made in order to man a fifteen-carrier force. This thesis indicates serious problems in manning if present supply and requirements trends continue. The thesis also identifies other manpower problem areas.

Master of Science in
Management
December 1981

Advisor: R. S. Elster
Department of
Administrative Sciences

A BATTALION/DIVISION FISCAL CONTROL SYSTEM
TRAINING RESOURCE MANAGEMENT

Gordon R. Jaehne
Captain, United States Army
B.S., United States Military Academy, 1973

This thesis examines the financial control structure for managing training resources utilized by U.S. Army Forces Command (FORSCOM). It reviews the current methodology for training resource management at FORSCOM, and provides an example of the conduct of budget forecasting and funding allocations. A fiscal model is developed to improve and simplify financial management of training resources within Army divisions and battalions. Data from a small scale test illustrate potential model data. Conclusions and recommendations are provided to determine if the model can be implemented in current Army budget procedures. This thesis not only attempts to focus upon current fund control system inadequacies, but also provides a clear review of the current methodology and presents a course of action to improve training resource management within Army units.

Master of Science in
Management
December 1981

Advisors: MAJ J. Ellis
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Administrative Sciences

IN INVESTIGATION OF THE LOCAL MANAGEMENT SUMMARY CODE AS
AN ASSIST TO PUBLIC WORKS MAINTENANCE MANAGEMENT

Keith A. Johnston
Commander, Civil Engineer Corps, United States Navy
B.S., San Jose State University, 1967

This thesis is an investigation into the use of the Local Management Summary Code (LMSC) contained within the Uniform Automated Data Processing System by Public Works Departments (PWD)s, as an assist in maintenance management. The difference between cost and maintenance management is discussed, and the need for maintenance management data gathering techniques is established. Current Naval Facilities Engineering Command (NAVFAC) management reports are detailed, as well as the pending Base Engineering Support Technical (BEST) system. A method of obtaining maintenance management data from existing comptroller reports is described. The efficacy of this LMSC supported system is evaluated through a questionnaire distributed to continental PWDs.

The survey results indicated beneficial maintenance management data support was gained by those activities aware of the LMSC applications for other than cost aggregation.

Master of Science in
Management
June 1982

Advisor: LCDR R. A. Bobulinski
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Administrative Sciences

EVOLUTION OF THE SHIPBUILDING ESCALATION CLAUSE

Joseph M. Jones
Commander, United States Navy
B.S., Virginia Polytechnic Institute, 1968

This thesis is an assessment of concerns expressed by government sources regarding the extent and the impact of current shipbuilding contract escalation coverage. The review encompasses the evolution of the current coverage and provides an examination of; how and why it has come about, the complexity of the escalation clause, the extent of coverage and the effects of the current clause.

The analysis emphasizes the change in the Navy's approach to escalation coverage that has occurred since 1962. It was concluded; that the ship acquisition environment has influenced the development of the current escalation clause, that escalation coverage has become progressively more comprehensive and that the use of the current escalation clause does have some adverse effect on the shipbuilding process.

Master of Science in
Management
June 1982

Advisors: J. W. Creighton
LCDR R. A. Bobulinski
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A LOOK AT TODAY'S ENLISTED WOMAN IN THE NAVY

Deborah Y. Kamin
Lieutenant Commander, United States Navy
R.N., B.S.N., Medical College of Georgia, 1973

Paula K. Sutherland
Lieutenant Commander, United States Navy
B.A., University of California, Davis, 1971
M.A., Central Michigan University, 1979

Declining pools of service-eligible men and increasing demands upon military manpower have forced the armed services to consider expanding the role of military women. The success or failure of increased utilization can only be determined through an assessment of actual data. Without such information, policy becomes arbitrary and successful gender integration less likely. Using the Survival Tracking File (longitudinal) as a primary source of data, the Total Population of Navy enlisted females, both Attrites and those on active duty (beginning fourth quarter FY 1977 and ending third quarter FY 1981), were examined to identify emerging trends. Frequency distributions and regression analyses revealed certain trends which warrant further investigation. The E-1 attrition rates in boot camp would suggest a need for better screening of applicants, and the major contribution of General Detail personnel to overall losses suggests further investigation of in-service working conditions and jobs as predictors of attrition.

Master of Science in
Management
December 1981

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Administrative Sciences

A MANPOWER TRAINING REQUIREMENTS MODEL FOR NEW WEAPONS SYSTEMS,
WITH APPLICATIONS TO THE INFANTRY FIGHTING VEHICLE

Douglas J. Kenehan
Captain, United States Army
B.S., The Ohio State University, 1972

This thesis documents the methodology and parameters used in designing a manpower training requirements model for new weapons systems. This model provides manpower planners with the capability of testing alternative fielding policies and adjusting model parameters to improve the use of limited personnel resources. Use of the model is illustrated in a detailed analysis of the planned introduction of the Infantry Fighting Vehicle into the Army. Two fielding policies are presented that illustrate the model's versatility. Additional computations are included, describing the derivation of instructor requirements from the model's output. The thesis is presented with the user in mind, emphasizing the importance of a thorough understanding of the factors that influence planning in a manpower system.

Master of Science in
Management
December 1981

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Operations Research

THE IMPLEMENTATION OF THE COUNTERINTELLIGENCE ASSISTANT PROGRAM

Martin Gilbert Kloster
Captain, Military Intelligence United States Army
B.S., South Dakota State University, 1971

The implementation of a new program within the Army's Military Intelligence Branch, the enlisted Counterintelligence career management field, is described. The creation of the duty position Counterintelligence Assistant represents a major change to the field through the introduction of an entry skill level which did not previously exist. This change was primarily a result of a chronic shortage of personnel which found skill level two filled at only 30 percent of authorized strength as of March 1981.

The implementation of this program is analyzed using an organizational development approach, and employs the use of a conceptual model to facilitate analysis. After a presentation of the identified need for change, and the intended processes for implementing the program, a diagnosis is accomplished. The areas included in the diagnosis are the recruitment and formal training phases, the role of the Counterintelligence Assistant, job satisfaction, and the retention potential of soldiers.

The conclusions identify actual and perceived weaknesses in the recruitment and utilization phases of implementing the program. Recommendations are provided.

Master of Science in
Management
December 1981

Advisors: J. W. Creighton
R. A. McGonigal
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Administrative Sciences

UNTIMELY PAYMENT OF SMALL PURCHASE INVOICES

Cedric Leroy Knight
Lieutenant, United States Navy
B.S.A., University of Georgia, 1974

Over ninety percent of all procurement actions fall into the small purchase category. The high cost of borrowing money has caused many vendors to criticize the government for its untimely bill paying of small purchase invoices. This study was undertaken to determine if untimely payment of small purchase invoices is a problem for the Department of the Navy and its suppliers which is adversely impacting the ability to do business.

The results of this study indicate: Settling billions of dollars in payments has become an important part of federal procurement. Navy bill paying functions are handled as part of the Integrated Disbursing and Accounting (IDA) system concept. When fully implemented IDA will improve the timeliness of small purchase invoice payments. In spite of difficulties they are currently experiencing, contractors are optimistic about doing business with the Navy. The biggest delay in the Navy bill paying cycle occurs in the certification process. The timeliness of paying small purchase invoices may be improved by considering two models proposed for future use.

Master of Science in
Management
June 1982

Advisor: CDR M. L. Sneiderman
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Administrative Sciences

SOCIAL, ECONOMIC AND BEHAVIORAL DIFFERENCES
AMONG ENLISTED PERSONNEL BASED ON AGE AT
SERVICE ENTRY

Steve M. Kreutner
Lieutenant, United States Navy
B.S., Southwest Missouri State College, 1975

The purpose of this thesis was to examine the behavior on non-prior service personnel in the military based on age at service entry. Cross-tabulation and Multiple Classification Analysis were used to study historical data on naval personnel supplied by the Defense Manpower Data Center, Monterey and survey information of DoD personnel gathered by the Rand Corporation in 1978. Areas of study included mental aptitude, length of service, contract preference, occupational choice, first-term attrition, dependent status, military compensation, re-enlistment and reserve entry intent. Perceptions of civilian employment, race relations, promotion and military life were also investigated. Differences between entry age cohorts were found in the areas of recruit quality and first-term retention.

Master of Science in
Management
October 1982

Advisor: G. W. Thomas
Department of
Administrative Sciences

AN INTERNAL REVIEW MODEL FOR THE NAVAL
MILITARY PERSONNEL COMMAND

Timothy William LaFleur
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

The function of Internal Review (IR) is defined and its importance highlighted in order to portray the current emphasis on IR in the Department of the Navy (DON). The DON has done little work in IR. The key traits, characteristics and standards important to the execution of IR were developed from a literature search and a survey of activities practicing IR. These traits, characteristics and standards were utilized as the groundwork for a DON IR model. The Naval Military Personnel Command (NMPC) was chosen for application of the model because of its large budget and current lack of IR capability. Research of civilian and military personnel activities similar to NMPC provided data on IR practices applicable to NMPC. A model for IR at NMPC was developed by selecting common practices and characteristics from the survey respondents that were feasible for NMPC execution. The author concludes that certain common traits are applicable to the IR of personnel activities but that tailoring to suit the needs of the individual entity is widely accepted.

Master of Science in
Management
December 1981

Advisor: LCDR R. A. Bobulinski
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Administrative Sciences

ASSESSMENT OF THE POTENTIAL FOR HUMAN RESOURCE ACCOUNTING IN
VENEZUELAN NAVY MANAGEMENT DECISION MAKING

Kenneth J. La Grave Marin
Commander, Venezuelan Navy

Human Resource Accounting (HRA) has been developed to provide accurate estimations of human value to organizational entities and useful information to managers in their decision making processes. It is shown that HRA can serve as an internal management tool.

In this thesis HRA concepts are presented. Consistent with concepts of assessing human resources, the costs and value to the organization are addressed to include significant and relevant criticisms from authors in the field of HRA. Finally, a historical cost method based upon HRA principles is proposed, specifically looking for impacts upon Venezuelan Navy managerial personnel decisions.

The application of HRA in the Venezuelan Navy is supported. The historical cost model suggested has attempted to contribute to a useful theory of HRA to improve control and management in the Venezuelan Navy personnel decision making process.

Master of Science in
Management
December 1981

Advisor: R. A. McGonigal
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NAVAL SHIPS ACQUISITIONS STRATEGY
FOR THE VENEZUELAN NAVY

Jose Manuel Leon Lara
Captain, Venezuelan Navy
B.S., Venezuelan Naval Academy, 1963

This thesis presents the results of an extensive research of the United States Navy and Venezuelan Navy acquisition processes for naval ships. A comparative evaluation is performed and critical areas have been identified in carrying out this complex process in both navies, resulting from various strategic environments and diverse domestic capabilities which combine to create unique acquisition methods. A proposed acquisition strategy is formulated from a management point of view, based on two models, to improve the existing Venezuelan Navy acquisition process--Model "A" to the procurement of ships from the non-U.S. international market, and Model "B" specifically to the acquisition of naval vessels from the United States of America through Military Aid/Foreign Military Sales Programs.

Master of Science in
Management
June 1982

Advisor: CDR M. L. Sneiderman
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Administrative Sciences

MANAGING GROWTH AND NEW WORK IN CONTRACTS FOR THE
REPAIR AND OVERHAUL OF U.S. NAVAL
VESSELS IN PRIVATE SHIPYARDS

Robert Vincent Law
Lieutenant Commander, Supply Corps, United States Navy
B.S., Florida State University, 1971

The U.S. Navy's procedures for repairing and overhauling Naval vessels in private shipyards is presented as an overview. Particular attention is given to the problems the Navy has experienced in controlling overhaul schedules and costs, and in distinguishing between growth changes and new work changes in overhaul contracts. Recommendations include procedures for standardizing definitions for growth and new work among Navy activities, simplifying current overhaul reporting procedures, and upgrading the quality of personnel assigned to overhaul contract administration functions.

Master of Science in
Management
December 1981

Advisor: J. W. Creighton
Department of
Administrative Sciences

TOWARD A FIFTEEN BATTLEGROUP NAVY: A SUPPLY SIDE VIEW AND
IMPLICATIONS FOR FORCE COMPOSITION AND PERSONNEL QUALITY

Mark H. Lepick
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

Cynthia D. Yarosh
Lieutenant, United States Navy
B.S., University of Tennessee, 1975

This thesis develops a methodology for addressing the personnel supplies necessary to meet the manpower requirements of the 15 battlegroup Navy. The methodology utilizes cross-sectional data, a Markov chain transitional flow model, projections of future Navy enlisted force levels, and economic and demographic conditions to derive required annual inputs and the numbers of qualified individuals, available to satisfy the input requirements. The effects of varied retention rates and the values of selected economic and policy related variables are analyzed in terms of input numbers required and policy implications. Analysis reveals that, though sufficient numbers of input personnel are available, the overall quality of these individuals may be inadequate to meet the increasingly technical demands of the 1980's. Further, although the outlook is favorable for reducing the present petty officer shortfall by 1990, the by-paygrade profile of petty officers may reveal significant imbalances between junior and senior grades.

Master of Science in
Management
June 1982

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THE UNIFORM CHART OF ACCOUNTS AND ITS USE IN
MANAGEMENT CONTROL

Tommy J. Little
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B.S., George Washington University, 1978

John P. Taylor
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1978

Full implementation of the Uniform Chart of Accounts (UCA) for Department of Defense (DOD) medical operations was accomplished by DOD on 1 October 1979. Both before and after UCA implementation, managers of health care delivery activities expressed concern about two of UCA's fundamental objectives: first, over the appropriateness of using UCA generated data in making comparisons of internal, interservice, intraservice, and civilian sector cost performance; and second, on the use of UCA data as a mechanism for measuring efficiency of operations. This thesis is an attempt to determine whether the prescribed cost accounting process results in information that can be used for these purposes, by either managers at the activity level, or by planners and decision makers at the Assistant Secretary of Defense for Health Affairs in the fulfillment of its DOD medical operations oversight function. The major approach is a critical analysis of the data generated by UCA. The limitations of the current process are discussed and the conclusions reached on the basis of the research and analysis are provided.

Master of Science in
Management
October 1982

Advisors: D. R. Whipple
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Administrative Sciences

U.S. PORT DEVELOPMENT AND THE EXPANDING WORLD COAL TRADE:
A STUDY OF ALTERNATIVES

Christopher W. Maillefert
Commander, United States Navy
A.B., Georgetown University, 1968

Victor H. Ackley
Lieutenant Commander, United States Navy
B.S., University of Oklahoma, 1970

This thesis contains an examination, analysis and commentary on the projected surge in the world's demand for coal as a principal energy source and how this impacts upon United States port development policy. It provides background on both the export coal trade and port development and then examines the central issues facing the federal government and the private sector as to how to increase port capacities to meet this new demand for export coal. A cost-benefit analysis of the alternative methods for coal related port development is conducted. This is followed by the presentation of an optimization model which can assist in prioritizing dredging projects in U.S. ports to gain maximum increased coal export capacity for a particular investment ceiling. Finally, a set of general and specific conclusions and recommendations are offered concerning changes necessary in the overall port development process in the United States.

Master of Science in
Management
June 1982

Advisor: R. G. Nickerson
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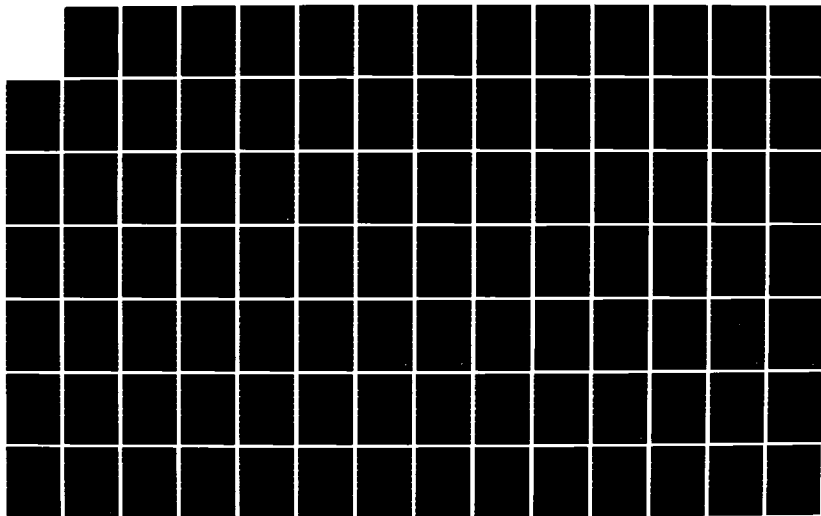
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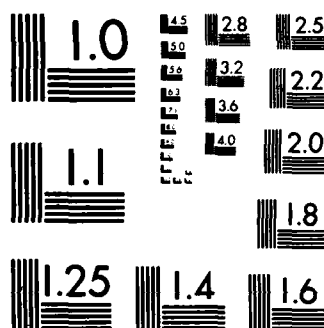
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CANDIDATES FOR DEGREES 1 OCTOBER 1981 - 30 SEPTEMBER
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A STUDY OF HUMAN FACTORS THAT AFFECT COMBAT
EFFECTIVENESS ON THE BATTLEFIELD

Charles D. Marashian
Captain, United States Army
B.A., University of California at Los Angeles, 1975

This study was designed to provide empirical data which would show what relationship existed among nine human factors and combat effectiveness of soldiers on the battlefield. These human factors were: leadership, training, combat experience, perception of survival possibility, acceptance by the unit, fatigue, hunger, the ability to withstand fire, and a soldier's belief in what he was doing was right. The study focused upon a sample of fifty Army infantry battalion commanders within the continental United States who had served as small-unit combat leaders in Vietnam. Data was obtained by the use of a mailed survey. The respondents tended to agree that among all of the human factors, leadership was strongly related to combat effectiveness. Among the nine human factors, respondents felt that leadership and training were the most important human factors relating to combat effectiveness. The respondents commented extensively that cohesion, training, belief in what they were doing, and leadership were the main motivators behind the soldier's willingness to fight.

Master of Science in
Management
June 1982

Advisor: R. McGonigal
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Administrative Sciences

FUNDING DEPOT LEVEL REPAIRABLES IN THE NAVY STOCK FUND: THE
EFFECT ON M.C.A.S. IWAKUNI, JAPAN

Stephen R. McComb
Lieutenant Colonel, United States Marine Corps
B.A., Willaim Jewel College, 1965

In 1978, in order to improve the management of Secondary Item Depot Level Repairables (DLRs), the Navy initiated a study and consequently a test to determine the proper method of funding these items. On 1 April, 1981, a three year prototype test involving Navy managed Non-Aviation Depot Level Repairables (DLRs) was implemented. This thesis describes the funding of Depot Level Repairables (DLRs) prior to 1 April, 1981, and as amended after the Non-Aviation Depot Level Repairables (DLRs) migration to the Navy Stock Fund. This thesis then describes the impact this change has had on Marine Corps Air Station Iwakuni Japan, from inception to June 1982. The thesis concludes by offering recommendations to improve supply support for the Marine Corps *and that Air Station* by improving the interface between the Marine Corps and the Navy Supply System.

Master of Science in
Management
June 1982

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Administrative Sciences

THE RESEARCH, DEVELOPMENT, TEST AND EVALUATION INCREMENTAL
PROGRAMMING POLICY AT DEPARTMENT OF DEFENSE
IN-HOUSE RDT&E ACTIVITIES

Carolyn Merlo
B.A., Chapman College, 1977

The evolution of the Congressional "power of the purse" led to more Congressional control of the Research, Development, Test and Evaluation (RDT&E) appropriation. One method of control was the RDT&E Incremental Programming Policy. The impact and implementation of the Policy at Department of Defense in-house RDT&E Activities is examined in this report. Questionnaires and interviews were used for research data.

Conclusions are that the RDT&E Incremental Programming Policy has had an impact at these Activities. However, administrative implementation within the Air Force, Army and Navy has had no major effect. Responses between the services to particular issues are different.

Master of Science in
Management
December 1981

Advisor: D. Whipple
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AN ANALYSIS OF INSTRUCTIONAL TELEVISION FOR NAVAL
AVIATION INSERVICE MAINTENANCE TRAINING

Ralph A. Morgan
Lieutenant, United States Navy
B.S., Northern Montana College, 1974

This study investigates the feasibility of replacing formal lecture and self study with instructional television as the primary method of inservice training for naval aviation squadrons. Two approaches were taken. First an experiment was performed to determine the relative efficiency and effectiveness of the three methods of instruction. Then, using the efficiency data from the experiment, a cost analysis was done to compare the relative costs of instruction via formal lecture and instructional television.

Based upon the established criteria for efficiency and effectiveness and the statistical data from the experiment, it was concluded that instructional television is both more efficient and effective than either formal lecture or self study. The cost analysis also demonstrated that instructional television is a more cost effective method with repeated uses.

Master of Science in
Management
March 1982

Advisor: J. D. Senger
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Administrative Sciences

A SIMULATION MODEL DEPICTING FLEET EXPANSION EFFECTS ON THE
FIRE CONTROL TECHNICIANS TRAINING PIPELINE

Larry W. Nelms
Lieutenant Commander, United States Navy
B.S., Southeast Missouri State University, 1971

Jeffery T. Smith
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

This thesis is a study of the training pipelines for the Navy's fire control technician ratings during projected fleet expansion to 600-plus ships by 1990. Yearly manning requirements for the FTM, FTG, and FTG(SS) ratings were identified. FTG and FTM transition flow matrices based upon 1983 POM retention goals were formed to derive rating end strengths. Rand Model forecasts for mental categories I, II, and IIIA annual accessions were used with predicted end strengths to project manpower supplies. Comparison of supply and demand projections indicated future manning shortfalls in the FT ratings. A FORTRAN-based computer language, designated SLAM, was used to construct a simulation model of the training pipelines. The model was employed to examine the impact of manpower procurement policy modifications upon Service schools' queue durations and stay times. An alternative manning policy was developed to overcome the forecasted manpower deficits without disrupting the schooling time requirements.

Master of Science in
Management
June 1982

Advisor: R. S. Elster
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Administrative Sciences

APPLICATION OF LIFE SUPPORT COST, PROVISIONING,
AND REPAIR/DISCARD MODELS TO WEAPON SYSTEM
PROCUREMENT DECISIONS BY SMALL COUNTRIES

Viggo Dam Nielsen
Major, Royal Danish Air Force
M.S.E.E., Danish Defense College, 1974

Haim Shahal
Lieutenant Commander, Israeli Navy
B.S.I.E., Technion, Israel Institute of Technology, 1977

In fulfilling their military needs, small countries often have to choose between systems which are produced by foreign defense industries, and therefore, they have little or no influence on development and production decisions. As a consequence, the expenditures to be considered are System Procurement Cost and Operations and Support Costs.

This thesis introduces an approach based on System Effectiveness and Life Support Cost (LSC) in the evaluation of alternative systems. It proceeds with a development of a set of general cost equations and a simplified LSC model, called SIMPLE. Two issues related to LSC, Initial Provisioning of Spares and Repair/Discard decisions, are specially treated. Computerized models are used for a numerical example in which the impact of the organizational structure, system characteristics, and some other factors on LSC and their cost sensitivity are evaluated.

Master of Science in
Management
December 1981

Advisor: M. B. Kline
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Administrative Sciences

AN EVALUATION OF ALLOWANCE DETERMINATION USING
OPERATIONAL AVAILABILITY

Patrick J. O'Reilly
Lieutenant Commander, United States Navy
B.B.A., Lamar University, 1969

Shipboard repair part allowances are presently computed using the Fleet Logistics Support Improvement Program which only considers individual part failure rate data and shipboard population. Two alternate allowance determination models are evaluated which consider other logistics factors when computing allowances. One model maximizes repair part availability using marginal analysis techniques and the other model optimizes system availability. The effectiveness of the three different models are compared for four different systems using the NAVSEA TIGER simulation program. The comparisons show that large improvements in system measures of effectiveness can be achieved using the alternative model which optimizes system availability without any increase in total investment costs for allowances. The alternative marginal analysis model did not produce consistently better results over all system configurations than did the FLSIP model.

Master of Science in
Management
June 1982

Advisor: F. R. Richards
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Operations Research

A STATISTICAL EVALUATION OF MILITARY CONSTRUCTION
PROJECT COST ESTIMATES

William J. Paine
Lieutenant, United States Navy
B.B.C., University of Florida, 1975

The provision of accurate total construction cost estimates to the Congress is a continuing problem for the Naval Facilities Engineering Command. It is the purpose of this thesis to provide a series of equations which will reduce the variance of the actual total cost from the estimated total cost. When these equations are applied over the long run to all Military Construction projects, this variance could be reduced by approximately ninety percent.

These equations are derived through the use of statistical regression of the past eight years Military Construction project's actual cost regressed on the project's authorized cost. A total of 1065 projects are compared and the resulting equations are assembled by Engineering Field Division (EFD) and by fiscal year.

In addition to the regression equations, an average project cost variation and a weighted cost variation is provided for each EFD. These variations can be used by the EFD's as trend indicators and measures of the overall effectiveness of the EFD's cost estimating practices.

Master of Science in
Management
June 1982

Advisor: D. C. Boger
Department of
Administrative Sciences

O&MN BUDGET EXECUTION AT U.S. NAVAL SHORE ACTIVITIES:
A MODEL FOR IMPROVING RESOURCE ALLOCATION

James Luis Parham
Lieutenant Commander, Supply Corps, United States Navy
B.S., Auburn University, 1969
M.S., Auburn University, 1971

Michael Hardcastle-Taylor
Lieutenant Commander, United States Navy
B.A., San Francisco State College, 1968

This thesis presents a model for improving the Operations and Maintenance Navy budget execution function at Naval field activities ashore. The model utilizes five techniques to encourage five concepts shown to be critical for effective budget execution. Following a description of the current extent to which field activities implement these concepts, the model is presented within the framework of its development and pre-testing in academia. Development of questionnaires for testing the model at five Naval field activities in California and the test results are also presented. Over 60 cost center managers from five test commands responded to the questionnaires and rated the model as yielding potential benefits over their current procedures. The respondents rated the model as having "moderate" acceptability and "good" applicability. Based on the test results, widespread promulgation of the model is recommended within the U.S. Naval Shore establishment.

Master of Science in
Management
December 1981

Advisor: LCDR R. A. Bobulinski
Department of
Administrative Sciences

AN ANALYSIS OF THE EFFECTS OF THE PROPOSED COAST GUARD
USED FEE ON THE OCEANGOING U.S. MERCHANT MARINE

James C. Perry
Lieutenant Commander, United States Coast Guard
B.A., Inter American University, 1976

John T. O'Connor
Lieutenant, United States Coast Guard
B.S., The United States Coast Guard Academy, 1974

This study is an analysis of the effects the proposed Coast Guard user fee of March 1982 will have on the U.S. Merchant Marine engaged in international trade. The analysis concentrates on the effect the fee will have on the profitability of the firms in the industry. From this analysis, conclusions are drawn as to the effect the fee will have on the ability of firms and ships to remain in the industry. A case study approach is used. Background material on U.S. Merchant Marine history, Federal government subsidy programs, and economic theories relevant to ocean shipping are presented and utilized in the analysis studies.

Master of Science in
Management
June 1982

Advisor: S. Liao
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Administrative Sciences

IMPLEMENTING MATERIAL REQUIREMENTS PLANNING IN THE MCLB
BARSTOW DEPOT MAINTENANCE ACTIVITY

Cleve B. Pillifant
Captain, United States Marine Corps
B.B.A., University of New Mexico, 1973

The U.S. Marine Corps will soon begin the procurement of the hardware and software required to install the DMA Integrated Management System (DIMS) in the Depot Maintenance Activities (DMA's). This system will utilize material requirements planning (MRP) as an aid in scheduling workload and determining material requirements. The objective of this thesis was to develop an implementation strategy for installing the proposed DIMS in DMA Barstow. The first phase of the development consisted of an extensive literature review regarding the development and implementation of MRP systems in the private sector. The differences between the MRP environment in the civilian manufacturing firm and the depot overhaul facility were then analyzed. Next, an analysis of DMA Barstow's readiness to begin preparing for implementation was conducted. Finally, an implementation plan is proposed which incorporates both DMA readiness and those unique aspects of a military repair facility which distinguish it from a private sector manufacturing activity.

Master of Science in
Management
October 1982

Advisor: A. W. McMasters
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DEPRECIATION REQUIREMENTS IN THE DEPARTMENT OF DEFENSE

John R. Pipho
Captain, United States Marine Corps
B.S., Old Dominion University, 1971

Government agencies are required by law to use an accrual basis of accounting in accordance with the principles and standards prescribed by the Comptroller General. One of these principles is to account for depreciation. The purpose of this study was to investigate the relevance of depreciation in the Federal Government, especially in the Department of Defense. This was accomplished through literature research and personal interviews. The author concludes that, while depreciation may have some relevancy in the area of reimbursables, it is not relevant to decision making or performance analysis--although capital asset costs are.

Master of Science in
Management
June 1982

Advisor: J. M. Fremgen
Department of
Administrative Sciences

AN ANALYSIS OF THE UNITED STATES MARITIME INDUSTRY SUBSIDY
PROGRAM AND NATIONAL DEFENSE: A RATIONAL
APPROACH TO SEALIFT READINESS

Leonard Lewis Proctor
Lieutenant Commander, Supply Corps, United States Navy
B.A., St. Joseph's College, 1967

This study examines the United States (U.S.) Maritime Industry as a potential defense force, its present defense capabilities and the government programs and legislation designed to support it. The current government subsidy program is determined to be inadequately structured to meet the nation's need for a merchant marine of modern, efficient and competitive vessels. Defense mobility has also declined as a result of ineffective programs. Included is a brief history of the Merchant Marine and its commercial and national defense objectives. The analysis discusses the criteria for selecting a viable ship design to fulfill the U.S. Merchant Marine requirements for commercial and defense missions. Conclusions and recommendations are described.

Master of Science in
Management
December 1981

Advisor: D. C. Boger
Department of
Administrative Sciences

LONG RANGE LOGISTICS PLANNING FOR VHSIC (VERY HIGH
SPEED INTEGRATED CIRCUIT) COMPONENTS

Ronald Passmore Reed
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of Hawaii, 1969

The Department of Defense is stimulating the research and development of vastly more complex and capable microelectronics to produce advance, militarized components in a timely and affordable manner. Through a six-year tri-service VHSIC (Very High Speed Integrated Circuit) Program that began in 1979, it will develop a radically new technology base for low cost, high throughput integrated circuits. Approaching a systems-on-a-chip capability, these high density circuits will require much less power and space, but will yeild far more reliability and performance. Because high technology developments have historically demonstrated less than optimum systems' readiness/availability due to degradations in logistics support, human factors and quality assurance, there has never been such an auspicious opportunity to realize the synergistic effects of integrated logistics planning on the implementation of VHSIC technology in weapons' design. This thesis explores that possibility and recommends specific actions for effective weapons systems' management.

Master of Science in
Management
December 1981

Advisor: J. W. Creighton
Department of
Administrative Sciences

UNITED STATES NAVY FLEET HOSPITAL SUPPORT: EVOLUTION,
ORGANIZATION, AND DEVELOPMENT

Gary L. Rupp
Lieutenant, Medical Service Corps, United States Navy
B.A., Chapman College, 1979

John K. Selfe
Major, Transportation Corps, United States Army
B.S., Saint Leo's College, 1976

This paper examines the evolution of the U.S. Navy's fleet Hospital Support System. Various agencies and bureaus within the Department of the Navy have been attempting to design a suitable, deployable combat hospital system. Each agency involved with the problem has produced varying designs for a feasible system. This paper integrates the various design proposals into one document for purposes of planning, comparison and coordination. It analyzes the current status of the Fleet Hospital Program and discusses methods that can be utilized by the planners of the system to enhance program review and development progress. The paper concludes with recommendations concerning methods for attaining resolution of the problems in designing and implementing a suitable Fleet Hospital configuration.

Master of Science in
Management
March 1982

Advisor: J. W. Creighton
Department of
Administrative Sciences

ORGANIZATION DEVELOPMENT: AN APPROACH FOR
ACHIEVING DESIRED ORGANIZATIONAL GOALS
WITHIN THE VENEZUELAN NAVY

Alberto Shadah Udelman
Commander, Venezuelan Navy
B.S., Venezuelan Naval Academy, 1965

The Venezuelan Navy has evolved over the last 30 years into a very professional, well trained, and highly educated organization. Even so, it is still confronting several organizational problems. Although the second smallest of the Armed Services of the country, the Navy is responsible for very sophisticated weapon systems and for being, maintaining and operating an efficient peacetime force. Today, the Venezuelan Navy faces one of its greatest challenges, namely to keep its high performance standards in the face of a huge budget cut, resulting from the income reduction due to declines in the world's oil price. This thesis examines the need to bring Organization Development into the organization in the immediate future. After analyzing the Latin-American environment, the Venezuelan Socio-Cultural traits, and the Navy's particularities, the concept of "tropicalized" OD is brought into the discussion. The view is taken that in order to effectively use OD, consideration of the adaptations of OD practice are required to help the Venezuelan Navy to achieve a fit among its processes, the people, and the environment.

Master of Science in
Management
June 1982

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A PRELIMINARY ANALYSIS OF TF34-100/400 JET ENGINE
REWORK DATA IN SUPPORT OF THE MRP SYSTEM
IMPLEMENTATION AT NARF ALAMEDA

Ernest R. Slaybaugh
Lieutenant Commander, United States Navy
B.S., Western Michigan University, 1972

The Naval Air Rework Facility (NARF) located at Naval Air Station (NAS) Alameda is in the process of implementing a Material Requirements Planning (MRP) system which will incorporate an inventory model to help manage those repair parts which are not always replaced during component rework. This thesis focused on analyzing TF34-100/400 jet engine rework data as one phase of that implementation. In particular, probability of replacement values were generated for the repair parts from demand data and the rework schedule during 1980, and the engine's bill of materials. In addition, a parametric analysis was conducted to study the optimal relationship between the shortage and surplus costs of the proposed inventory model for the TF34 repair parts. The analyses highlighted the importance of determining the actual shortage costs resulting from a work stoppage and suggested some potentially useful forms for the surplus cost parameter.

Master of Science in
Management
December 1981

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MANNING THE ARMY IN 1990

Has Slone, Jr.
Captain, United States Army
B.A., Morehead State University, 1975

This thesis is a study of the feasibility of manning an 18 division U.S. Army by FY1990. To accomplish this, aggregate and paygrade requirements were established and a review of manpower supply and demand issues was made. Two manpower scenarios were then developed and used in predicting aggregate and paygrade requirements. Specific predictive information used included personnel attrition, retention, promotion and accession data. The information was processed using an APL program called MANMOD. The program is based on Markov Chains and allows projection of personnel supply data into the future (in this case until 1990). The data projections provided predictions on whether present policies will meet future paygrade requirements, or whether changes in policies will have to be made in order to man an 18 division (active duty) Army. The result of this thesis indicates that the personnel supply required to fill 18 divisions will be available, but problems may be encountered in attaining a sufficient number who can qualify in AFQT test categories I-IIIA.

Master of Science in
Management
June 1982

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SNAP II: SHIPBOARD MICROCOMPUTER APPLICATIONS IN PERSONNEL,
ADMINISTRATION, AND TRAINING - A USER'S PERSPECTIVE

Peter Greig Smith
Lieutenant, United States Navy
B.S., B.S., University of Washington, 1975

This thesis describes the functional requirements of the Shipboard Non-Tactical Automated Data Processing Program (SNAP II): a microcomputer system designed to automate formerly manual procedures in the areas of shipboard supply, maintenance, and personnel/administration. A proposed Personnel Readiness and Training Management Subsystem (PTMS) is also described. Both systems are analyzed from a user's perspective. Recommendations are made regarding installation approach and composition of implementation teams. Applications for potential inclusion in SNAP II are also recommended.

Master of Science in
Management
December 1981

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Administrative Sciences

DCASPRO USE OF THE "BASKET METHOD"

Raymond W. Smith
Lieutenant Commander, United States Navy
B.S., Utah State University, 1970

The "basket method", a finite sampling technique, developed by Professor K. T. Wallenius for NAVPRO Grumman to reduce proposal backlogs, is examined for application in the DCASPRO environment. The "basket method" is discussed and the differences and similarities of the DCASPRO/NAVPRO environment are considered. A survey of DCASPROs is utilized to ascertain the extent to which they meet certain preconditions for application of the "basket method". A simulation using data from DCASPRO Northern Ordinance is presented to provide an example of possible application of the method. The author concludes that the "basket method" may be a useful tool for DCASPROs that satisfy the required preconditions.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
Department of
Administrative Sciences

ANALYSIS OF FIELD ACTIVITY PERSPECTIVES OF CENTRALIZED NON-APPROPRIATED
FUND ACCOUNTING, BANKING, AND PAYROLL PROCEDURES
WITHIN THE DEPARTMENT OF THE NAVY

Steven Jay Sonntag
Lieutenant Commander, United States Navy
B.A., University of California, Los Angeles, 1971

This study analyzes the strengths and weaknesses of the United States Navy's centralized nonappropriated fund accounting, banking, and payroll procedures from the standpoint of the many field activity managers who are required to administer and conform to them. A comprehensive review of the flow and control of nonappropriated funds within the Department of the Navy is presented, with particular emphasis on the mission and objectives of the Nonappropriated Fund Accounting System Section (NAFAS) and the administrative details of currently mandated accounting, banking, and payroll procedures. Environmental factors that impact on field activity managers are also discussed. Their responses to a world-wide, author-developed survey of April 1981 dealing with the efficiency and effectiveness of centralized systems and procedures are displayed and analyzed. Identifiable problems and trends resulting from this analysis are subsequently discussed, conclusions and recommendations are advanced by the author, such as the fact that the present system has contributed to substantial improvements in the NAFAS network as seen by field personnel.

Master of Science in
Management
June 1982

Advisor: LCDR R. A. Bobulinski
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COAST GUARD COMPENSATION ALTERNATIVES

Gary K. Sooy
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

This thesis analyzes the preferences of active duty Coast Guard personnel concerning the following areas of compensation - housing, government messing facilities, the commissary/exchange system, and medical care. Attitudes concerning a possible conversion from the present pay system to a salary system or a cafeteria-style compensation plan are also obtained. Data was provided by two survey documents. The first survey was administered service-wide in January 1980 to ascertain the housing situation. The second survey, which addressed the other areas of compensation under consideration, was distributed to a sample of 800 active duty personnel selected at random from the entire service. Results indicate a *widespread desire for changes in the service's compensation system*. As a whole, respondents desire more flexibility in the pay system to accommodate individual preferences for compensation in each area that was analyzed.

Master of Science in
Management
December 1981

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Administrative Science

MATERIAL REQUIREMENTS PLANNING AND LOGISTIC SUPPORT FOR
A FIELD SERVICE ORGANIZATION:
A "REAL WORLD" EXAMPLE

Gary W. Strawn
Lieutenant Commander, United States Navy
B.A., San Jose State College, 1968

In an effort to better understand the problems and advantages of utilizing commercial contract service support for complex military electronics systems, the author seeks to analyze a large electronic equipment manufacturer's inventory management system as it is used to support a field service division. A cost analysis of plausible shipping and storage strategies is performed. The complexities of adapting a material requirements planning system to provide improved inventory management for the unscheduled demands of a service organization, are discussed.

The report includes a series of memorandums to the company recommending pragmatic solutions to the problems. The company has implemented the recommendations.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
Department of
Administrative Sciences

FOREIGN MILITARY SALES BETWEEN THAILAND AND U.S.

Surapoj Tongsim
Lieutenant J.G., The Royal Thai Navy
B.S., Naval Academy School of Thailand, 1978

The procurement of materials by Foreign Military Sales (FMS) between Thailand Government and U.S. Government has been worthwhile in the past. Further, the money that the Thailand Government pays for materials procured from the U.S. has increased every year. The scope of this thesis includes the FMS policy of U.S. Government, the departments in U.S. that pertain to FMS, the documents that are used in FMS etc. The objective of the thesis is to increase the effectiveness and efficiency of the Royal Thai Navy in procurement. If Thai Navy Officers, who work in procurement, can understand the functioning of the U.S. Government, it will help smooth the procurement of FMS and assure good relationships between both countries.

Master of Science in
Management
June 1982

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DEMAND AND SUPPLY OF HIGH QUALITY SAILORS

Wayne R. Van Doren
Lieutenant, United States Navy
B.A., University of Texas, 1975

This study was conducted to determine empirically the demand and supply of high quality sailors in the U.S. Navy. The Navy's demand for high quality sailors is presented in two dimensions; the entry level demand and utilization demand. Three forms of enlistment supply models are developed for high school diploma graduate enlistments and for high quality enlistments using ordinary least squares regression methodology. The demand and supply results are then applied to an increasing size Navy scenario. A two-tier pay system is implied from the application of the supply models since the high quality enlistees are less responsive to pay changes than are high school diploma graduate enlistees.

Master of Science in
Management
December 1981

Advisor: G. W. Thomas
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Administrative Sciences

PROSPECTIVE MODEL AND ITS METHODOLOGY OF SUPPLIES FOR
THE REPAIR AND MAINTENANCE OF THE VENEZUELAN
NAVAL SHIPS TO THE THIRD LEVEL

Jesus B. Vivas
Lieutenant Commander, Venezuelan Marine Corps
A.N., Venezuelan Naval Academy, 1967

This work provides a prospective model for optimizing production and reducing operational costs in the "system of provision of supplies," with the goal of effecting maintenance and repair in Naval Units up to the Third Level. It shows that the development of a system of supply of spare parts and equipment will be effective, operative and dynamic within its referential framework. The functions of maintenance at the Third Level, and its role in the integral development and operations of the Navy, are clearly defined. This study does not delve deeply into analytical methods and techniques to establish the category of maintenance most adequate for each equipment and/or system. Rather the object of this thesis is to illustrate the procedure to systematize the supply of materials, be it that of initial procurement or that which must be maintained in inventory to support the operational effort of maintenance at the Third Level for the Venezuelan Navy.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
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Administrative Sciences

CIVIL PENALTY EFFECTIVENESS IN THE UNITED STATES COAST GUARD

Robin Alan Wendt
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1971

The civil penalty is the prime sanction in the United States Coast Guard's law enforcement programs. There have been numerous efforts to describe the impact of Civil penalties on entities involved in the legal compliance process. These efforts have resulted in the development of economic models, few of which have been tested with actual data, and none of which have been tested in a Coast Guard environment.

This thesis analyzes Coast Guard civil penalty data to validate a basic economic model. An entity perceives an expected cost of non-compliance based on the probability of detection and the penalty assessed if detected. This is compared to the cost of compliance and the entity, as a rational actor, chooses the least expensive alternative.

The data analysis indicates support for the basic model as well as the hypothesis that increasing the enforcement activity raises the cost of non-compliance more than increasing the level of assessed penalties.

Master of Science in
Management
December 1981

Advisor: D. C. Boger
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Administrative Sciences

COST EFFECTIVENESS ANALYSIS OF HOMEPORTING AN AIRCRAFT
CARRIER IN THE MEDITERRANEAN SEA

Michael J. Worley
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

William T. Minges, III
Lieutenant, United States Navy
B.A., California State University at Northridge, 1973

This analysis examines the cost effectiveness of two alternative approaches to providing United States Naval power projection to the Mediterranean Sea. The two alternatives are deploying an aircraft carrier from Norfolk, Virginia, which is the present posture, and homeporting an aircraft carrier in one of two overseas ports--Rota, Spain or Naples, Italy. A cost model, which the authors believe is appropriate for comparing the costs of deployment versus the costs of homeporting overseas for any military unit, is used to perform a differential cost analysis on each alternative. These costs are projected over a ten year period and discounted back to present value. Due to the high cost of dependent travel, and transportation of household goods and privately owned vehicles (POV), the present deployment alternative appears best from a strictly financial viewpoint except when the value of the above cost elements are kept to a minimum. However, the possibilities of limiting dependent travel and extending tour length, and nonquantifiable factors such as increased retention could shift the recommendation in favor of homeporting.

Master of Science in
Management
September 1981 (Minges)

Advisor: LCDR R. Bobulinski
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Master of Science in
Management
December 1981 (Worley)

INDUSTRY PERCEPTIONS OF THE COST/SCHEDULE CONTROL
SYSTEMS CRITERIA (C/SCSC)

Eric H. Worrall
Lieutenant Commander, United States Navy
B.S., Tulane University, 1971

The purpose of this study was to determine industry perceptions of the Department of Defense's Cost/Schedule Control Systems Criteria (C/SCSC) and to determine whether or not the original objectives of the C/SCSC have been fulfilled. Interviews were conducted with contractors from highly varied fields of endeavor in order to achieve opinions from a wide spectrum of the defense industry. Responses were analyzed to ascertain what areas require improvement and to form conclusions on the value of the C/SCSC.

Master of Science in
Management
June 1982

Advisor: J. W. Creighton
Department of
Administrative Sciences

MASTER OF SCIENCE
IN
MECHANICAL ENGINEERING

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A STUDY OF THE EFFECT OF INTERRUPTED
QUENCHES ON A THERMOMECHANICALLY
PROCESSED HIGH CARBON STEEL

Steven A. Barton
Lieutenant, United States Navy
B.S., University of Wisconsin, 1977

The effects of short quench interruptions on the percentage retained austenite and the hardness and microstructure were investigated for AISI 52100 steel. Effects were observed for two starting microstructures: an as-received, spheroidize-annealed material, and a fine-grained, warm rolled material. Results indicate that retained austenite and hardness were independent of the quench interruption temperature. The warm rolled material had a higher percentage retained austenite as well as a higher hardness for all quench interruption temperatures. This is attributed to a finer starting microstructure and the retention of refinement throughout the heat treatment process. Evidence of preferred orientation was found in the case of the material showing prior warm rolling.

Master of Science in
Mechanical Engineering
October 1982

Advisor: T. R. McNelley
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LOCAL HEAT TRANSFER COEFFICIENTS AROUND A CYLINDER IN
OSCILLATING FLOW

Fred W. Brunson, Jr.
Lieutenant, United States Navy
B.S.M.E., University of Illinois, 1974

Local and average heat transfer coefficients were determined for a right circular cylinder in an oscillating flow. Spanwise platinum heater strips were used to heat the cylinder isothermally over the lower 180 degrees from the front to rear stagnation point. The four inch diameter cylinder was positioned both normal to and at 45 degrees to the flow direction.

Data was gathered for diameter Reynolds numbers from 100,000 to 300,000. Large amplitude oscillations were imposed upon the mean flow using a rotating shutter arrangement. Frequencies of 0, 5, 10, 22, 50, 100 and 126 Hertz were investigated.

For normal flows, local heat transfer coefficients in the wake and average Nusselt numbers were enhanced above values for steady flow, for runs having large amplitude. In the 45 degree flows, no significant change in heat transfer was noted with oscillating flow.

Master of Science in
Mechanical Engineering
December 1981

Advisors: J. A. Miller
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AERODYNAMIC LOADS ON A BALL-OBTURATED TUBULAR PROJECTILE

William Arthur Bry
Lieutenant, United States Navy
B.S., Wofford College, 1974

A tubular projectile is one with a hole bored along its longitudinal axis. The hole presents a problem in getting the round expelled from a gun. Some means of sealing the hole until the round clears the muzzle is required. A ball-obturator offers one practical means of accomplishing this without any accompanying FGD hazard. The ball-obturator, analogous to a common ball-valve, remains closed under the force of the expanding propellant charge and opens as soon as it is released. The high projectile spin rate created in the barrel causes the ball to align its ports with the projectile tube through a complex gyrodynamic motion that is highly dependent upon the external moments relative to the spinning projectile.

This study presents results of wind-tunnel tests designed to quantify lift, drag, and moment forces imparted to the projectile by the ball as it transitions to a full open position. Wind-tunnel balance designs are discussed and equations for deduction of forces are presented. Drag and moment coefficients are plotted as functions of ball angle and presented along with Schlieren photographs of the flow at each test point. Techniques for separating tunnel interference from projectile forces are presented along with an uncertainty analysis.

Consistent results are obtained for drag measurement. Lift forces proved undeterminable with the balance design used. Moment measurements showed much data scatter though interesting trends are noted and correlations made with the flow visualizations. Finally the balance deficiencies are uncovered through the uncertainty analysis and a new design is proposed for increasing the accuracy of the moment measurement.

Master of Science in
Mechanical Engineering
March 1982

Advisor: R. H. Nunn
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THEORETICAL MODELING OF FLUID INTERACTIONS
PRODUCED BY SHIP BOW THRUSTERS

Thomas Charles Cooper
Lieutenant Commander, United States Navy
B.S.M.E., Ohio State University, 1970

An analytical model of a jet injected normally from a flat plate into a uniform crossing flow was modified to provide an improved method of predicting the interference effects arising from the complex flow fields induced by ship bow-thrusters. This model is an extension of previous work based upon a description of the jet as a series of distributed vortices. The analysis takes into account the position of the effective source of the jet and the blockage due to the presence of the jet in the crossflow. Improvement in the predicted pressure distribution on the plate was obtained by adopting a new formula for determining the effective jet source which more closely approximates the experimental results. Further improvement resulted from the incorporation of a symmetric foil shape to simulate the presence of the jet and its highly turbulent wake. The accuracy of the model was evaluated for representative jet-to-crossflow velocity ratios. Good agreement with experimental results was achieved for large portions of the interaction field with particular improvement in the near-field and downstream regions.

Master of Science in
Mechanical Engineering
March 1982

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CHARACTERISTICS OF A FOUR-NOZZLE, SLOTTED SHORT
MIXING STACK WITH SHROUD, GAS EDUCTOR SYSTEM

Carl John Drucker
Lieutenant, United States Navy
B.S.M.E., Penn State University, 1976

Cold flow tests were conducted on a four nozzle (nozzles tilted at a 15 degree angle) gas eductor system to evaluate the system's performance utilizing a short slotted mixing stack and two shrouds with diffuser rings. The stack length-to-diameter ratio, (L/D), was 1.0, and with the shroud and diffuser rings extended the L/D to 1.5. The difference in the two shrouds was the separation distance between stack and shroud and between shroud and diffuser rings. This separation distance resulted in exit diffuser angles of 10.8 and 7.3 degrees. The nozzles were constructed with a ratio of total area of primary flow to area of mixing stack of 2.5. Secondary and tertiary pumping coefficients, mixing stack pressure distributions, and exit velocity profiles were used to evaluate the shrouded mixing stacks. The stack and shrouds were evaluated with the stack slots closed and then with the slots open. Secondary pumping was found to be independent of changes in diffuser angle. Tertiary pumping decreased with the separation distance and only showed a slight increase when the slots were opened. The 7.3 degree shroud had a lower tertiary flow; however, in the regions of low flow at the exit plane, the severity of the velocity fluctuations was much reduced and hence better overall performance was achieved.

Master of Science in
Mechanical Engineering
March 1982

Advisor: P. F. Pucci
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TESTING OF A SHROUDED, SHORT MIXING STACK
GAS EDUCTOR MODEL USING HIGH
TEMPERATURE PRIMARY FLOW

Ira James Eick
Lieutenant Commander, United States Navy
B.A., University of Idaho, 1970

An existing apparatus for testing models of gas eductor systems using high temperature primary flow was redesigned and modified to provide improved control and performance over a wide range of gas temperatures and flow rates. Pumping coefficient, temperature, and pressure data were recorded for two gas eductor system models. The first, previously tested under hot flow conditions, consisted of a primary plate with four straight nozzles and a slotted, shrouded mixing stack with two ring diffuser ($L/D=2.5$). The second was geometrically similar to a model previously tested in cold flow. This model employed a primary plate with four tilted-angled nozzles and a slotted, shrouded mixing stack with two ring diffuser ($L/D=2.5$). Thermal imagery was used to generalize the data obtained by direct temperature measurement. The validity of cold flow model testing is confirmed. The short stack with tilted-angled primary nozzles is shown to have superior mixing and pumping performance, but to exhibit significantly higher shroud and diffuser surface temperatures.

Master of Science in
Mechanical Engineering
June 1982

Advisor: P. F. Pucci
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Mechanical Engineering

CHARACTERIZATION OF AN HY-130 STEEL WELDMENT BY
TRANSMISSION ELECTRON MICROSCOPY

Wallace Michael Elger
Lieutenant, United States Navy
B.S.M.E., United States Naval Academy, 1974

A wrought HY-130 steel weldment was studied to provide information about metallurgical differences in the weld heat affected zone (HAZ). Three GMAW welded areas were mapped and analyzed: heavily tempered, moderately tempered and untempered regions. Transverse sections were cut along the weld HAZ and the Section microhardness compared with a previous microhardness traverse across the region to determine the location within the HAZ. Transmission electron microscopy revealed the occurrence of significant metallurgical changes from the fusion line to the HAZ/base metal interface. Microstructures were found to be similar to those of a low carbon steel, changing from a fine lath martensite at the HAZ/base metal interface to a mixture of upper bainite and fine lath martensite in the HAZ near the fusion line and finally to lower (acicular) bainite in the weld metal.

Master of Science in
Mechanical Engineering
December 1981

Advisor: K. Challenger
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A MICROPROCESSOR CONTROLLED
AUTONOMOUS SENTRY ROBOT

Hobart R. Everett
Lieutenant Commander, United States Navy
B.E.E., Georgia Institute of Technology, 1979

A microprocessor controlled prototype robot was designed and built to perform as an autonomous sentry and serve as a test vehicle for evaluation of appropriate sensors and their associated interface circuits.

A ten channel near-infrared proximity detection system was developed for use in collision avoidance, with moderate range navigational planning incorporated through use of a sonar system operating in conjunction with a long range near-infrared detector.

The system was provided with a means of locating and connecting with a free standing recharging station when internal sensors detected a low battery condition.

A software structure was created to provide supervisory control of the prototype and produce a reasonably intelligent process of goal achievement through execution of ordered sequences, with provision to deal with unexpected events of higher priority.

Master of Science in
Mechanical Engineering
October 1982

Advisor: R. E. Newton
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Mechanical Engineering

SHAPE OPTIMIZATION OF TRUSSES SUBJECT TO STRENGTH, DISPLACEMENT, AND FREQUENCY CONSTRAINTS

Jorge E. Felix
Lieutenant, Ecuadorian Navy
B.S., Naval Postgraduate School, 1981

Three-dimensional trusses are designed for minimum weight, subject to constraints on: member stresses, Euler buckling, joint displacements and system natural frequencies. Multiple static load conditions are considered.

The finite element displacement method of analysis is used and eigenvalues are calculated using the subspace iteration technique. All gradient information is calculated analytically.

The design problem is cast as a multi-level numerical optimization problem. The joint coordinates are treated as system variables. For each proposed configuration, the member sizes are updated as a sub-optimization problem. This sub-problem is efficiently solved using approximation concepts in the reciprocal variable space. The multi-level approach is shown to be an effective technique which conveniently takes advantage of the most efficient methods available for the member sizing problem.

Examples are presented to demonstrate the method. The optimum configuration is shown to be strongly dependent on the constraints which are imposed on the design.

Master of Science in
Mechanical Engineering
December 1981

Advisor: G. N. Vanderplaats
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Mechanical Engineering

DEVELOPMENT OF A COMPUTER PROGRAM FOR THE TESTING AND
EVALUATION OF NUMERICAL OPTIMIZATION TECHNIQUES

James Edward Fitzgerald III
Lieutenant, United States Navy
B.S., Middle Tennessee State University, 1975

A three dimensional finite element code is written for truss analysis and design. Trusses may be designed for minimum weight subject to constraints on: member stresses, Euler buckling, joint displacements and system natural frequency. The optimum configuration may be found in addition to optimization with respect to member sizes.

The finite element code may be used as a stand alone analysis tool or may be coupled to an optimizer of the user's choice. The finite element displacement method of analysis is used for static analysis and eigenvalues are calculated using the subspace iteration technique.

A major portion of this work is the software (user guide) which is presented in detail with examples and results. Explanation of how this code is coupled to an optimizer is given.

Design variables are member area sizes, joint coordinates, or both. Examples are presented to demonstrate the method.

Master of Science in
Mechanical Engineering
June 1982

Advisor: G. N. Vanderplaats
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Mechanical Engineering

PROBABILISTIC DESIGN USING
NUMERICAL OPTIMIZATION

James Harris Hopper III
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

A FORTRAN program has been developed to allow for the use of probabilistic design methods in the numerical optimization process. The program was written as a set of subroutines for COPES (Control Program For Engineering Synthesis). COPES maximizes or minimizes a numerically defined objective function subject to a set of inequality constraints using the optimization program CONMIN (A Fortran Program for Constrained Function Minimization). The program developed here allows for the use of both the normal and lognormal distribution models. Design examples are presented to demonstrate the program capabilities. User instructions are provided for inclusion in the COPES user's manual.

Master of Science in
Mechanical Engineering
October 1982

Advisor: G. N. Vanderplaats
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Mechanical Engineering

INVESTIGATION OF A LOOSE-WEBBED PADDLE SURFACE IMPULSE PROPULSOR

James Michael Hunn
Lieutenant, United States Navy
B.ChE, Auburn University, 1976

The purpose of this investigation was twofold. The first goal was to develop an understanding of the flow behavior and interaction with the blades of a paddlewheel type Surface Impulse Propulsion (SIP) system operating over a water surface. The second goal was to experimentally evaluate the effect of interblade webbing and wheel internal pressure on the thrust performance of a webbed SIP system.

A series of configurations of forward speed, wheel rpm, blade immersion depth, web length, and internal wheel pressure were tested. Application of the webbing material significantly improved thrust production. Two critical parameters were the ratio of web length to blade tip to tip distance and internal system pressure. Both influenced the losses common to such a system, water entrainment at blade exit and air entrainment in the blade cavities at blade entry. Improvements of as much as 600% were seen in thrust coefficient for the best case, and significant performance improvement was noted over a wide range of parameters.

Master of Science in
Mechanical Engineering
October 1982

Advisor: J. F. Sladky
Department of
Mechanical Engineering

APPLICATION OF OPTIMIZATION TECHNIQUES TO NAVAL
SURFACE COMBATANT SHIP SYNTHESIS

James L. Jenkins
Lieutenant, United States Navy
B.S.E., University of Michigan, 1975

This thesis presents a method of reducing the time required to accomplish ship design feasibility studies by coupling a naval surface combatant synthesis model with a general purpose nonlinear optimizer. Brief descriptions of optimization techniques and synthesis models are presented. The selection of design variables, constraints, and objective function is presented via a design example. Further examples are given illustrating the ability to start with infeasible designs and proceed, through optimization, to feasible designs. Examples of ships developed using different objective functions are also presented. The synthesis/optimizer system provides results in a rapid and description manner which compare favorably with existing designs and provides the naval architect with an efficient tool to use in the conceptual design phase of naval surface combatants.

Master of Science in
Mechanical Engineering
October 1982

Advisor: G. N. Vanderplaats
Department of
Mechanical Engineering

LIQUID CRYSTAL MAPPING OF JET CROSSFLOW INTERACTIONS

Michael David Johnson
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

The use of liquid crystal thermography is discussed as a technique for visualizing the disturbance field created on a surface from which a jet is injected into a crossing flow. The study is part of an ongoing investigation of the performance of jet steering systems such as ship bow thrusters. An experimental apparatus was designed and built to provide a heated surface coated with liquid crystals. For a range of jet-to-crossflow velocity ratios, the temperature field on the flat plate was visually represented. The technique allowed continual visual observation of the cooling effects of the jet as jet velocity increased. It also showed the cooling pattern similarities that exist at the same velocity ratios for different crossflow velocities. Strong visual similarities were shown to exist between the temperature distribution on the flat plate as depicted by the liquid crystals and the theoretical surface velocity field around a jet modelled as a symmetrical foil near the point of injection and a vortex sheet in the plumes.

Master of Science in
Mechanical Engineering
December 1981

Advisor: R. H. Nunn
Department of
Mechanical Engineering

AN EXPERIMENTAL APPARATUS TO STUDY ENHANCED
CONDENSATION HEAT TRANSFER OF STEAM ON
HORIZONTAL TUBES

Raymond Lynn Krohn
Lieutenant Commander, United States Navy
B.S., North Carolina State University, 1972

In an effort to explore the possibility of building compact naval steam condensers, an experimental apparatus was designed and constructed to study enhanced condensation heat transfer of steam on horizontal tubes. Special care was taken to ensure a leak-tight apparatus so that the non-condensable gas content of the steam can be kept to a few parts-per-million. The boiler and steam piping is made of glass and stainless steel with rubber gaskets. Copper is used for the condensing tubes. The completed system has been tested satisfactorily at full power.

Master of Science in
Mechanical Engineering
June 1982

Advisor: P. J. Marto
Department of
Mechanical Engineering

USE OF IMPLANT TESTING TO EVALUATE THE SUSCEPTIBILITY
OF HY-130 STEEL WELDMENTS TO
HYDROGEN EMBRITTLEMENT

Bradley J. Mason
Lieutenant, United States Navy
B.S.M.E., United States Naval Academy, 1976

The cracking that may occur near the fusion zone of a steel weldment can often be attributed to the embrittlement of the microstructure by hydrogen induced during the welding process. The modified implant test was used in this case to evaluate the hydrogen-assisted cracking susceptibility of three separate heats of HY-130 steel, which included both cast and wrought plate. Welding was accomplished by the gas metal-arc spray transfer process. Cracking in all plates was observed to initiate and propagate in an area near the weld interface. The exact location of the fractures varied according to the amounts of diffusible hydrogen present and the type of material being tested. The effect of stress intensity together with hydrogen content on the mode of fracture present is also addressed in detail.

Master of Science in
Mechanical Engineering
December 1981

Advisor: K. D. Challenger
Department of
Mechanical Engineering

TYPE 1 HOT CORROSION FURNACE TESTING
AND EVALUATION

Thomas Leon McGowen
Lieutenant, United States Navy
B.S., University of Kansas, 1975

Furnace testing of superalloys and coating systems was conducted to determine if type 1 hot corrosion seen in operating gas turbine engine and burner rigs could be more simply reproduced. Furnace parameters were varied to determine optimum (most aggressive) values for a short term type 1 hot corrosion test. The results of these tests were ranked and compared to data available from a variety of burner rig tests and will serve as a base line for further type 1 hot corrosion materials and coating research.

Master of Science
Mechanical Engineering
October 1982

Advisor: D. H. Boone
Department of
Mechanical Engineering

SYNTHESIS OF A COLLISION TOLERANT FIXED
NAVIGATION MARKER SYSTEM

Max R. Miller Jr.
Lieutenant Commander, United States Coast Guard
B.S., California Maritime Academy, 1971

The collision tolerant navigational marker system study was undertaken to determine the feasibility of using rubber as a flexure element when mounted in a fixed navigational structure for shallow water applications (20 ft. depth or less). Quantitative evaluations will be made of the system's technical feasibility, performance under environmental loadings, availability, associated installation systems, and cost. It is the intent of this work to develop a data base, investigate the use of mathematical/computer models, develop a configuration matrix of installation modes.

Master of Science in
Mechanical Engineering
October 1982

Advisor: J. F. Sladky
Department of
Mechanical Engineering

THERMAL MARTENSITIC TRANSFORMATION CYCLING
IN CU-ZN-AL SHAPE MEMORY ALLOYS

Willaim E. Muesing
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

The effect of multiple thermal cycles between the martensitic phase and parent phase of selected Cu-Zn-Al alloys was studied. As thermal cycling progressed the martensite start temperature (M_s), parent phase finish temperature (A_f), and the temperature at which the maximum martensitic peak height occurred (M_{max}) were all observed to shift upward. The proportion of the sample undergoing thermal transformation decreased with increasing numbers of thermal cycles, as was noted by a decrease of total transformation energy. Examination in a transmission electron microscope found dislocation substructures apparently generated by the martensitic transformations.

Master of Science in
Mechanical Engineering
March 1982

Advisor: A. J. Perkins
Department of
Mechanical Engineering

AN INVESTIGATION OF THE FEASIBILITY OF IMPLEMENTING SUBSTANTIAL
FINITE ELEMENT CODES ON POPULAR MICROCOMPUTERS

David Joseph Mulholland
Lieutenant, United States Navy
B.S.M.E., University of Utah, 1975

The size and cost of microcomputers continue to decrease while their memory capacity and execution speed increase. These advances should result in small, inexpensive machines attaining the same computing power as current mainframe models. The interim need is to adapt general finite element codes to present day, less capable microcomputers. This thesis explores the program structure, memory management, I/O procedures and equation solving methods necessary to accomplish that task. The equation solving capacity and speed of the Apple-II Plus Personal Computer System and the Hewlett-Packard System 45(A) Desktop Computer are compared. A finite element program for the static analysis of space trusses is presented, as adapted to and tested on the Apple-II Plus. The program output may be printed in either English or French.

Master of Science in
Mechanical Engineering
October 1982

Advisor: G. Cantin
Department of
Mechanical Engineering

EFFECTS OF CONDENSATE INUNDATION AND VAPOR VELOCITY
ON HEAT TRANSFER IN A CONDENSER TUBE BUNDLE

Paul Jeffrey Noftz
Lieutenant, United States Navy
B.S., Ohio University, 1972

A five tube column test condenser was modified to facilitate easier tube removal and installation and to allow for the simulation of larger depth tube bundles. Heat transfer coefficients were then determined for sixty-two runs conducted at steam supply pressures of 35, 40, and 50 psig with the system operated at test condenser pressures of approximately 2 and 15 psia. Each run was five minutes long with temperature, pressure, and flow rate data taken at one minute intervals.

The results revealed that the average tube wall temperature and the heat transfer coefficients for a given tube of a tube bundle increased as the mean vapor velocity increased, but decreased as the amount of condensate inundation increased. The experimentally obtained values for the heat transfer coefficients were compatible with the Nusselt predictions for the runs conducted at 15 psia, but greatly exceeded the Nusselt predictions for the runs conducted at 2 psia. However, for the 2 psia runs, the heat transfer coefficients for the top tubes agreed closely with an experimental correlation proposed by Fujii. The simulation of a tube bundle of more than five active tubes per column at the 2 psia test condenser pressure demonstrated heat transfer coefficients closer to the Nusselt theory than when only five active tubes were considered.

Recommendations to improve the test apparatus and to conduct additional tests are provided.

Master of Science in
Mechanical Engineering
June 1982

Advisor: P. J. Marto
Department of
Mechanical Engineering

DUAL-PHASE NOZZLE FLOW

Thomas C. Nollie, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

A review of the dual-phase power system was made. This study focused on the multi-component nozzle of this dual-phase system. First, an existing computer code predicting the nozzle performance was updated, and second a series of experimental tests on a variable area, two-dimensional nozzle was performed to verify the computer code.

Master of Science in
Mechanical Engineering
October 1982

Advisor: J. F. Sladky
Department of
Mechanical Engineering

AN INTERACTIVE COMPUTER PROGRAM FOR THE
PRELIMINARY DESIGN AND ANALYSIS
OF MARINE REDUCTION GEARS

Joseph Louis Paquette
Lieutenant, United States Navy
B.S.S.E., United States Naval Academy, 1976

The objective of this project was to develop an interactive computer program providing flexibility in the design and analysis of marine propulsion gears. The program, Reduction Gear Analysis and Design (REGAD), will handle conventional parallel axis and simple epicyclic reduction gears. It is capable of generating preliminary designs of new gear sets or providing analyses of existing or proposed gear sets. Program development, organization, and operation are discussed.

Master of Science in
Mechanical Engineering
March 1982

Advisor: G. Cantin
Department of
Mechanical Engineering

AN EXPERIMENTAL TECHNIQUE FOR THE STUDY OF VELOCITY
PROFILES IN A GROWING DROPLET USING
A PULSED NITROGEN LASER

August Frederick Pellin III
Lieutenant, United States Navy
B.S.S.A., Miami (OHIO) University, 1976

An ultraviolet beam (337.1 nm) from a pulsed nitrogen gas laser fired through a fluid containing a photochromic dye produces opaque traces in the fluid along the path of the laser beam. Subsequent movement of the fluid deforms the opaque traces and produces a record of the fluid flow. A high powered laser has been designed, built, and tested. Velocity distributions have been obtained in slowly forming droplets of solvent in an immiscible ambient fluid.

Master of Science in
Mechanical Engineering
March 1982

Advisor: W. G. Culbreth
Department of
Mechanical Engineering

INTEGRATION OF FINITE ELEMENT ANALYSIS
PROGRAM FOR CONDUCTION HEAT TRANSFER
WITH COMPUTER ANALYSIS LANGUAGE

Warren Leigh Roberts
Lieutenant Commander, United States Navy
B.A., Macalester College, 1971

The Finite Element Analysis Program (FEAP) was modified and integrated with the Naval Postgraduate School version of the Computer Analysis Language (CAL-NPS). This enables the solution of linear and non-linear, two and three dimensional heat conduction problems in an interactive mode. The usual types of boundary conditions, including radiation, may be specified. The heat conduction group includes prompts for user supplied data. Several existing CAL-NPS commands were improved and a "HELP" facility was added. Commands were added for visual display of the finite element mesh at graphics terminals. The User Guide for this expanded version of CAL-NPS is provided.

Master of Science in
Mechanical Engineering
June 1982

Advisor: G. Cantin
Department of
Mechanical Engineering

THE INFLUENCE OF SOLUTION TREATMENT TIME AND QUENCH RATE ON
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF HIGH-
MAGNESIUM ALUMINUM-MAGNESIUM ALLOYS

Reuben H. Shirah
Lieutenant Commander, United States Navy
B.S., University of Utah, 1973

Aluminum alloys containing 8-10 wt pct magnesium with further minor additions of Cu and Mn were solution treated for either 10 hours or 24 hours and subsequently quenched in either oil or water. Microstructural analysis by transmission electron microscopy and optical microscopy demonstrated that a 24-hour solution treatment when followed by water quenching was effective in retention of Mg in solution promoting more uniform precipitation during subsequent warm rolling, especially in an alloy containing 8.14 wt pct Mg-0.41 wt pct Cu. Tension and fatigue testing revealed improved fatigue resistance for this alloy when comparison was made to shorter solution treatment times and less severe quench conditions. The addition of Mn, possibly in conjunction with increased solution treatment temperature, appears to be especially effective in development of a homogeneous microstructure; an alloy containing 10.2 wt pct Mg-0.52 wt pct Mn exhibited a yield strength of 398 Mpa (57.8 Ksi), a tensile strength of 455 Mpa (75.8 Ksi) with 11 pct elongation to fracture.

Master of Science in
Mechanical Engineering
December 1981

Advisor: T. R. McNelley
Department of
Mechanical Engineering

FRICTION MEASUREMENT BY MEANS OF A GYROSCOPIC MASS

Thomas Leo Stowell
Lieutenant, United States Navy
B.A., University of Minnesota, 1972
M.A., University of North Carolina, 1974

Previous theoretical and experimental studies have demonstrated that when a bored sphere is contained within a spinning cavity, the sphere will rotate so that its major axis of inertia is aligned with the axis of spin of the cavity. Under certain conditions, the time required for alignment is inversely proportional to the coefficient of sliding friction. The objective of this investigation has been to investigate this phenomenon as a method for determination of the coefficient of sliding friction between various materials. An experimental apparatus was designed and built and tests were conducted in order to evaluate the basic theoretical premise.

Master of Science in
Mechanical Engineering
March 1982

Advisor: R. H. Nunn
Department of
Mechanical Engineering

AN INVESTIGATION INTO THE TWO-WAY SHAPE MEMORY TRAINABILITY
OF POLYCRYSTALLINE CU-ZN-AL ALLOYS

Richard O. Sponholz
Lieutenant Commander, United States Navy
B.A., Queens College of the City University of New York, 1970

The ability of polycrystalline Cu-Zn-Al alloys to demonstrate increasing percentage two-way shape memory (TWSM) displacements with "training" is investigated. Results indicate a definite relationship between increased cycling and increased TWSM ability. The empirical training cycle curve parameters are presented and shown to change with cycling. Most parameters show a decreasing trend. Transmission electron microscopy of trained alloys is conducted in an effort to mechanistically explain TWSM training.

Master of Science in
Mechanical Engineering
June 1982

Advisor: A. J. Perkins
Department of
Mechanical Engineering

OSCILLATING FLOW ABOUT YAWED CYLINDERS

Dean O. Trytten
Lieutenant Commander, United States Navy
B.S., North Carolina State University, 1970

The force acting on yawed smooth and rough circular cylinders in oscillating flow have been investigated for the purpose of determining the appropriate force-transfer coefficients and the applicability of the "independence principle." The results have shown that the flow about each cylinder is unique and the independence principle does not hold true. In addition, a comprehensive sensitivity analysis has been carried out to investigate the effects of undetected environmental disturbances on the force-transfer coefficients and the limits of probable errors have been delineated.

Master of Science in
Mechanical Engineering
March 1982

Advisor: T. Sarpkaya
Department of
Mechanical Engineering

A SIMPLE INTERACTIVE PROGRAM TO DESIGN
SUPERCAVITATING PROPELLER BLADES

Marc B. Wilson
Lieutenant, United States Coast Guard
B.S., SUNY, Maritime College at Fort Schuyler, 1973

A self-contained, rapid, Computer Aided Design (CAD) program for a desk top computer (i.e., HP 9845) was developed for a first cut approximation for the design of a supercavitating propeller blade. This program eliminated the error-prone, tedious interpolation of empirical data graphs by providing approximations and curve fitting techniques to augment existing formulae. The complex Goldstein function and the inexact Prandtl approximation were replaced by a more simple function, the Wilson factor, that maintained the confidence level of the manual calculations.

Master of Science in
Mechanical Engineering
June 1982

Advisor: D. M. Layton
Department of
Aeronautics

MASTER OF SCIENCE
IN
METEOROLOGY

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A STUDY OF EAST-COAST CYCLOGENESIS EMPLOYING
QUASI-LAGRANGIAN DIAGNOSTICS

Peter R. Conant
Captain, United States Air Force
B.S., North Carolina State University, 1976

The absolute vorticity and angular momentum budgets for the Presidents' Day Cyclone, 18-19 February 1979 are evaluated employing the quasi-Lagrangian diagnostic technique in pressure coordinates. The First GARP Global Experiment (FGGE) Level III-b data set prepared by the European Center for Medium Range Weather Forecasts is used to define the storm and to calculate the budgets.

Important differences are found between the FGGE and mass budget vertical motion estimates. The budget results illustrate the importance of inward eddy mode lateral transport and advection at upper levels and mean mode transport due to convergence at lower levels. The vertical redistribution plays a lesser role but is more significant in the angular momentum budget. The vertical vorticity advection and tilting terms are comparable in magnitude. The largest budget residuals occur during the period of most intense convective activity which indicates a need for a better understanding of the vertical redistribution processes.

Master of Science in
Meteorology
June 1982

Advisor: C. H. Wash
Department of
Meteorology

AN ANALYSIS OF A PUFF DISPERSION MODEL FOR A COASTAL REGION

Stephen K. Rinard
National Weather Service
B.S., Texas A&M University, 1964

The Riso National Laboratory, Roskilde, Denmark, atmospheric puff dispersion model has been tested for an atmospheric-marine environment. This three-dimensional model simulates the release of Gaussian pollutant puffs and predicts their concentration as they are diffused and advected downwind by a horizontally homogeneous, time-dependent wind. Atmospheric characteristics such as turbulence intensity, potential temperature gradient, bouyant heat flux and maximum mixing depth have been considered. Model predicted pollutant concentrations have been compared to airborne sampled observations. The effect of coastal turbulence not observed by the single point meteorological measurements made onboard ship greatly affects the advection and diffusion of a plume as it moves onshore. Additional measurements/predictions particular to the coastal area will have to be incorporated into the model for it to accurately predict the onshore movement of pollutants.

Master of Science in
Meteorology
June 1982

Advisor: G. E. Schacher
Department of
Physics

TYPHOON MOTION FORECASTING USING EMPIRICAL
ORTHOGONAL FUNCTION ANALYSIS OF
THE SYNOPTIC FORCING

Alan R. Shaffer
Captain, United States Air Force
B.S., University of Vermont, 1976
B.S., University of Utah, 1977

Empirical Orthogonal Function (EOF) analysis is used to describe the synoptic forcing features of selected northwestern Pacific Ocean tropical cyclones from 1967 to 1976. EOF analysis is applied to the geopotential field at 850, 700 and 500mb on a 120 point grid with 5 degree latitude and longitude spacing that is centered on the storm. The 120 EOF coefficients (for each level) are computed for a sample of 454 cases in the history file. The coefficient vectors are truncated to the first 10 coefficients based on the Monte Carlo selection criteria of Preisendorfer and Barnett. These coefficients describe about 85% of the variance in the fields. The synoptic forcing represented by the EOF coefficients is then used as a predictor in a regression analysis track forecast scheme, along with past storm movement and intensity during the past 36 hours. The EOF-based regression equations are verified over an independent sample of 50 storms, and the position errors compared to the official Joint Typhoon Warning Center (JTWC) forecast errors. The EOF-based regression equations give, on the average, a 17% reduction in error when compared to the official forecast issued by JTWC. Over the independent sample, the 500mb equations performed better than the equations of the other two levels.

Master of Science in
Meteorology
March 1982

Advisor: R. L. Elsberry
Department of
Meteorology

APPLICATION OF QUASI-LAGRANGIAN DIAGNOSTICS TO THE STUDY
OF NUMERICALLY-SIMULATED OCEANIC CYCLONES

William C. Tallman
Captain, United States Air Force
B.S., St. John's University, 1968
M.S., Northeast Missouri State University, 1973

A study of two oceanic extratropical cyclones, generated by the Navy Operational Atmospheric Prediction System (NOGAPS) model (see Sandgathe, 1981), reveals a simultaneous development of the upper- and lower-tropospheric features while these features maintain their positions relative to each other. These cyclones also develop extreme shear in most synoptic fields after 120 hours of numerical simulation.

The mass budgets of these cyclones show a concentration of inward lateral transport (convergence) in the lowest model layer and outward lateral transport (divergence) in a layer centered near 300 mb. Time sections of lateral transport, vertical velocity and mass tendency reveal that these cyclones develop in two phases--an explosive cyclogenesis phase, and a quasi-steady state phase. These time sections also reveal a 12-hour cyclic pattern embedded within the two phases of cyclone evolution. This 12-hour cyclic pattern is not evident in the map sequences of the surface pressure.

Master of Science in
Meteorology
June 1982

Advisor: C. H. Wash
Department of
Meteorology

AN APPLICATION OF A NUMERICAL SEA ICE MODEL
TO THE EAST GREENLAND AREA

Walter B. Tucker

U.S. Army Cold Regions Research and Engineering Laboratory
B.S., Virginia Polytechnic Institute, 1968

A dynamic-thermodynamic sea ice model which employs a viscous-plastic constitutive law has been applied to the East Greenland area. The model is run on a 40-km spatial scale at 1/4-day time steps for a 60-day period with forcing data beginning on 1 October 1979. Results tend to verify that the model predicts reasonable thicknesses and velocities within the ice margin. Thermodynamic ice growth produces excessive ice extent, however, probably due to inadequate parameterization of oceanic heat flux. Ice velocities near the free ice edge are also not well simulated, and preliminary investigations attribute this to an improper wind field in this area. A simulation which neglects ice strength, effectively damping ice interaction with itself and allowing no resistance to deformation, produces excessive ice drift toward the coast and results in unrealistic nearshore thicknesses. A dynamics-only simulation produced reasonable results including a more realistic ice extent, but the need for proper thermodynamics is also apparent. Other simulations verify that ice import from the Arctic Basin, and ice transport due to winds and currents, were also important components in the model studies.

Master of Science in
Meteorology
December 1981

Advisor: R. L. Haney
Department of
Meteorology

MASTER OF SCIENCE

IN

**METEOROLOGY
AND
OCEANOGRAPHY**

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THE IMPACT OF TECTONIC ACTIVITY IN
THE DEVELOPMENT OF MONTEREY
SUBMARINE CANYON

Robert Lloyd Allen, Jr.
Lieutenant, United States Navy
B.S., Florida State University, 1975

Evidence is presented that indicates that Monterey Submarine Canyon was once the terminus of a major land drainage system. This pre-existing drainage system is not in evidence today because it has been altered by displacement along the San Andreas Fault. A numerical model based on conservation of mass and plate tectonic reconstructions is utilized to reconstruct the topography of the region as it appeared prior to onset of motion along the San Andreas Fault. Model results indicate that the Colorado River may have drained into Monterey Bay during early Miocene time.

Master of Science in
Meteorology and Oceanography
March 1982

Advisors: E. C. Haderlie
Department of
Oceanography

OCEANIC MIXED LAYER RESPONSE TO TIDAL PERIOD INTERNAL WAVE MOTION

Rolf John Burger
Lieutenant, United States Navy
B.S., University of North Carolina, 1974

The purpose of this research was to investigate the effect of tidal-period internal wave vertical motion on oceanic mixed layer dynamics, and to discern the effect upon the diurnal evolution of thermoclines, as observed during MILE (mixed layer experiment). Vertical advection was added to a one-dimensional bulk model of the mixed layer with an assumed linear in z and sinusoidal in time dependence. The rate of mixed layer deepening was therefore due to the combination of vertical motion and entrainment. The first significant result was the finding that the interaction between vertical mixing and vertical motion depended upon the wave frequency and its phase relation to the diurnal heating cycle. Second, linear and non-linear interactions of the wave induced vertical motion with the cyclical boundary conditions can generate two-dimensional (x - z) structure in the near-surface temperature field of an initially horizontally homogeneous ocean under the influence of horizontally homogeneous surface boundary conditions. Finally, this advective interaction increases the utility of the mixed layer model in single station forecasting.

Master of Science in
Meteorology and Oceanography
June 1982

Advisor: R. W. Garwood, Jr.
Department of
Oceanography

A STUDY OF HORIZONTAL SEA SURFACE TEMPERATURE VARIABILITY

William Aubrey Butler
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

The horizontal variability or "patchiness" in the sea surface temperature structure is examined on length scales between 0.6 and 76.8 kilometers. A primary purpose was to test the hypothesis that atmospheric forcing is a cause of horizontal temperature variance on these length scales. Using continuous sea surface temperatures acquired in the Central North Pacific Ocean, spectra were computed for temperature variance. The variability in these spectra on seasonal, synoptic, and diurnal periods was then examined and correlated with changes in atmospheric conditions. Important results found included a seasonal dependence for the patchiness structure, a negative correlation between surface temperature variance and wind speed on a synoptic time scale, and a diurnal variability in patchiness that may be explained by solar insolation and turbulent heat exchange with the atmosphere. In conclusion, a strong atmospherically controlled temporal variability in the small scale horizontal sea surface temperature variance is found and may explain inconsistencies in earlier observational and theoretical studies.

Master of Science in
Meteorology and Oceanography
December 1981

Advisors: R. W. Garwood, Jr.
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Oceanography

A SYNOPTIC/STATISTICAL ANALYSIS OF SUMMER SEASON CIRCULATION PATTERNS
OVER EASTERN ANTARCTICA DURING MOIST AIR INTRUSIONS

Ronald L. Fauquet
Lieutenant Commander, United States Navy
B.A., University of California at Los Angeles, 1970

U.S. Navy weather forecasters in Antarctica provide forecast services for aviation and field operations of the U.S. Antarctic Research Program. Due to very limited conventional data, meteorological satellite imagery becomes a primary resource for circulation diagnosis. However, qualitative interpretation techniques, as used in Antarctica, fail to provide definitive information on the intensity of synoptic features.

A compositing technique was used in the study to identify a 400 mb geopotential height anomaly pattern common to a satellite-observed cloud signature indicating moist air intrusions onto the continent. Two test cases, one dependent and one independent, are explored to determine the usefulness of the height anomaly pattern as an operational analysis aid over the data sparse regions of eastern Antarctica. Finally, the model 400 mb analysis is compared qualitatively to the National Meteorological Center and Fleet Numerical Oceanography Center 500 mb analyses for the same times.

The model developed in the study shows some promise of improving the operational Naval Support Force Antarctica's circulation analyses in data poor areas.

Master of Science in
Meteorology and Oceanography
June 1982

Advisor: R. J. Renard
Department of
Meteorology

SINGLE-STATION ASSESSMENTS OF THE SYNOPTIC-SCALE FORCING ON
THE MARINE ATMOSPHERIC BOUNDARY LAYER

John P. Gleason
Lieutenant, United States Navy
B.S., University of Utah, 1976

Knowledge of the large-scale vertical velocity is required to predict the evolution of the atmospheric planetary boundary layer (APBL). Since naval operations are often conducted in data sparse regions, single-station assessments of the vertical velocity are necessary. Data to evaluate such assessments were obtained from rawinsondes taken at San Nicolas Island, California. Vertical velocity estimates obtained by vertical integrations of the moisture budget equation (Q-method) and by the adiabatic method were used to initialize an APBL 24-hour prediction model. RMS error statistics on predicted inversion height, potential temperature, and specific humidity were computed for the forecasts and compared to the RMS errors of a persistence forecast. Calculation of the vertical velocity by the Q-method showed the most promise. However, no single-station assessment method improved on the persistence forecasts.

Master of Science in
Meteorology and Oceanography
June 1982

Advisor: K. L. Davidson
Department of
Meteorology

OCEAN RESPONSE TO HURRICANE FORCING

Charles K. Hopkins

Lieutenant, United States Navy

B.S., (Physical Oceanography), University of Washington, 1976

B.S., (Atmospheric Sciences), University of Washington, 1976

The current meter records collected at three sites in the Gulf of Mexico during the passage of Hurricane Frederic are analyzed to determine the storm-induced flow at various ocean depths, determine the associated energy increase and decay, and compare these observations to similar results from a numerical model. The records at the two deeper sites are rather unique because they are within 100 km of the hurricane track. Pre-storm conditions are controlled by topography, and as the storm passes there is an abrupt change in the direction of flow and initiation of a strong inertial response at all levels of the two deeper sites. After this initial surge, the residual flow tends toward the pre-storm direction. The horizontal kinetic energy associated with inertial motion is calculated. The energy increase and decay is shown to vary with depth.

An embedded mixed-layer ocean circulation model (Adamec et al, 1981) is forced with an idealized storm translating at the same speed (7.5m s^{-1}) as Frederic. The abrupt response and strong inertial component predicted by the model is qualitatively similar to the observations.

Master of Science in
Meteorology and Oceanography
June 1982

Advisor: R. L. Elsberry
Department of
Meteorology

OCEANIC DATA ASSIMILATION TESTS WITH A ONE-DIMENSIONAL MODEL

Dennis Glenn Larsen
Lieutenant, United States Navy
B.S., University of Washington, 1974

A data assimilation technique for incorporating relatively sparse ocean thermal structure profiles into the Garwood (1977) Oceanic Planetary Boundary Layer (OPBL) model is proposed. A summary of the data assimilation tests by Elsberry and Warrenfeltz (EW) is presented. The complete and perfect model generated verification data from the EW study were used to simulate incomplete and noisy data as might be expected in real data verifications. Random errors that are normally distributed about the mean mixed layer depth (MLD) and temperature (MLT), are added to subsets of the EW verification data during the summer and winter regimes. From these simulated tests, it was concluded that a data assimilation technique with a 1-D OPBL model can improve predictions of the ocean thermal structure even with incomplete and noisy verification data.

Real bathythermographic temperature profiles from Ocean Weather Station PAPA are then inserted into the Garwood model to verify the EW data assimilation studies. The tests with real data demonstrate the necessity of defining the MLD in an observed profile that is consistent with the model output MLD. In addition, biases were observed that originated from the use of an imperfect model. After the elimination of the biases and the MLD discrepancies, it is suggested that a 1-D model used for data assimilation can improve predictions of the ocean thermal structure.

Master of Science in
Meteorology and Oceanography
December 1981

Advisor: R. L. Elsberry
Department of
Meteorology

OCEANOGRAPHIC INVESTIGATION OF THE
EAST GREENLAND POLAR FRONT
IN AUTUMN

William F. Perdue
Lieutenant, United States Navy
B.A., University of Texas, 1974

Dense data sampling, both horizontally and vertically, have provided new insight into the time/space variability of the East Greenland Polar Front during late autumn. A core of warm Atlantic Intermediate Water (AIW) is frequently found pressed against the eastward edge of the front which is warmer than previously described and is often fragmented and full of finestructure. There is also finestructure present in the Polar Water in the form of lenses of anomalous water, generally warm in cold matrix, which are formed by the turbulent entrainment of AIW at the front. There is a pronounced movement of AIW under the front which results in a warming of the waters found on the Greenland Shelf. This warmth has as its source AIW which has penetrated the lower portion of the front either some distance north of Fram Strait or along a part of the East Greenland Current or both. There is evidence that eddies or other mechanisms are involved in this process.

Master of Science in
Meteorology and Oceanography
March 1982

Advisor: R. G. Paquette
Department of
Oceanography

ANALYSIS OF ANTARCTIC REMOTE-SITE AUTOMATIC WEATHER STATION
DATA FOR PERIOD JANUARY 1979 - FEBRUARY 1980

Kurt M. Scarbro
Lieutenant Commander, United States Navy
B.A., University of Michigan, 1970

The second generation of the Stanford University developed Automatic Weather Station (AWS-2A) was placed at seven remote locations in the Antarctic in early 1979. Data transmissions were received via the NIMBUS VI platform from the Goddard Space Flight Center. Quality and amount of data received from the seven stations varied greatly, with many periods of sporadic reporting or none at all. The processing of the data from mid January 1979 to early February 1980 was done with the goal of determining its credibility and its usefulness to the United States Antarctic mission as managed by the National Science Foundation. Various statistical measures were applied to the reported meteorological observations of surface pressure, wind and ambient air temperature, following closely the approach used by Renard and Salinas on AWS-1 data in 1976-1977. Emphasis was also placed on AWS-2A contributions to identifying mesoscale features around McMurdo Sound, Antarctica. Also discussed are two Adrams Bouy sites, set up as interim observation platforms between the AWS-1 and AWS-2A deployment.

Master of Science in
Meteorology and Oceanography
June 1982

Advisor: R. J. Renard
Department of
Meteorology

ONE-DIMENSIONAL MODEL PREDICTIONS OF UPPER OCEAN TEMPERATURE
CHANGES BETWEEN SAN FRANCISCO AND HAWAII

Edward F. Steiner
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

Previous tests of one-dimensional oceanic mixed layer models have generally used long time series of data at specific locations, such as at the ocean weather ships. In this work the Garwood model was used to make a series of predictions of upper ocean thermal structure changes along the shipping track between San Francisco and Hawaii, from 1 January to 16 December 1978. The initial and verifying ocean temperature profiles provided by the National Marine Fisheries Service, were objectively analyzed on a space-time grid, where the spatial dimension was along the shipping track. The grid resolution is 100 km and 15 days, which defines the basic prediction increment. The ocean mixed layer model was driven with the winds and heat fluxes derived from the Fleet Numerical Oceanography Center's atmospheric analyses. A preliminary check of local heat balance was made by comparing the observed change in heat content with the accumulated surface heat flux. Comparison of the observations and the 1-d mixed layer model predictions shows a large variability in model performance. Relatively good predictions were made during periods of shallowing or unchanging mixed layer depth, while poorer predictions occur during periods of rapid deepening. Variability along the track indicates superior performance in the subtropical region, with prediction accuracy decreasing in the region of the subtropical front and the California Current, where physical processes not included in the model are relatively large.

Master of Science in
Meteorology and Oceanography
December 1981

Advisor: R. L. Elsberry
Department of
Meteorology

MASTER OF SCIENCE
IN
OCEANOGRAPHY

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OVERWINTERING STRATEGIES OF THE CALANOID COPEPOD CALANUS PLUMCHRUS
IN A PERIODICALLY ANOXIC BRITISH COLUMBIA FJORD

Michael Bruce Cowen
Lieutenant, Canadian Armed Forces
B.Sc. University of Victoria, 1975

A study was conducted to determine the excretion physiology and feeding behaviour of overwintering Calanus plumchrus V in Saanich Inlet, B.C. In December, no C. plumchrus V were found above 75m. 48% of the population was within 25m of the bottom. Oxygen concentrations below 75m declined steadily during the winter. By January, water below 150m was anoxic. Overwintering C. plumchrus V from Saanich Inlet would not eat under laboratory conditions. Seven species of cultured phytoplankton and Artemia sp. nauplii were offered as food. Mean ammonia excretion rates were 15.41 and 15.33 x 10⁻³ micro-gm atoms nitrogen per mg dry weight per day. These values are 10-20 times lower than those previously reported for overwintering copepods. It was calculated that C. plumchrus V had sufficient body nitrogen to survive at least 5 months at the observed rates of nitrogen excretion. It is concluded that C. plumchrus V in Saanich Inlet enter into diapause to survive low winter food levels. Feeding does not occur, protein metabolism is low and lipid reserves are not utilized.

Master of Science in
Oceanography
October 1982

Advisor: E. C. Haderlie
Department of
Oceanography

CALCULATION OF HYDROGRAPHIC POSITION DATA BY LEAST SQUARE ADJUSTMENT

Francisco Castro e Silva
Lieutenant Commander, Portuguese Navy
B.A., Portuguese Naval Academy, 1967

When redundant observations are available, hydrographic positioning problems require the application of a data adjustment method so that all information may be used for obtaining the most reliable "fix". One of the oldest and best engineering techniques developed for the purpose is based on the least squares principle. The theoretical background is provided to explain that principle and the technique for its application. Also, the analytical solutions, and respective computer programs implementing them, are developed for the following hydrographic positioning methods: a) fix by N azimuths, b) fix by N sextant angles, c) fix by two range distances and one azimuth. For each method, an illustrative application of the respective computer program is presented.

The least squares adjustment method not only yields the most likely values for the fix coordinates but also statistically quantifies position accuracy. Relative accuracy achieved with conventional survey methods is elevated to absolute accuracy when redundant observations are made and adjusted using the method of least squares.

Master of Science in
Oceanography (Hydrography)
June 1982

Advisor: D. Leath
Department of
Oceanography

THERMAL CALIBRATION OF SATELLITE INFRARED IMAGES AND
CORRELATION WITH SEA-SURFACE NUTRIENT DISTRIBUTION

Vitor Martinho F. Pereira e Silva
Lieutenant, Portuguese Navy
B.A., Portuguese Naval Academy, 1976

Satellite infrared imagery off the California coast, near Pt. Sur, show thermal patterns associated with an upwelling center; the patterns frequently curl cyclonically when interacting with the warmer California Current. This pattern shows sharp thermal fronts, easily identified in satellite IR images, that are strongly correlated with nutrient fronts during the early stages of upwelling. With sea truth data available, it was feasible to calibrate satellite derived sea surface temperature, by applying radiative transfer theory, and to infer nutrient concentrations from their linear inverse correlations with temperature. Thus, it was possible to calibrate satellite thermal fields to produce maps of nutrient distributions. When the inferred relationships were applied over representative regions of the upwelling center, standard deviations of 0.5°C, 1.7 μM and 0.1 μM were computed for temperature, nitrate and phosphate, respectively.

Master of Science in
Oceanography
June 1982

Advisor: E. Traganza
Department of
Oceanography

APPLICATION OF ADDITIONAL SECONDARY FACTORS TO LORAN-C
POSITIONING FOR HYDROGRAPHIC OPERATIONS

Gerald E. Wheaton
Lieutenant, National Oceanic Atmospheric Administration
B.S., California State University, Humboldt, 1975

The application of LORAN-C in the hyperbolic mode as a positioning system for hydrographic surveys was investigated. Observed LORAN-C time differences from a field test conducted in Monterey Bay, California were compared to calculated time differences determined from geographic positions based on a microwave positioning system. Four methods were used to determine the calculated time differences. The first three methods were (1) applying only the seawater Secondary Factor, (2) computing the time difference based on a Semi-Empirical TD Grid, and (3) applying ASF Correctors from the DMAHTC LORAN-C Correction Table. The final method applied multiple observed ASF Correctors at five minute latitude and longitude intervals. By applying multiple observed ASF Correctors, which was the most accurate method, a 38.3 meter 1 drms with a lane offset of 3 to 12 meters using the 9940 X-Y LORAN-C combination was obtained. Based upon the results presented, it may be possible to use LORAN-C for hydrographic surveys at scales of 1:80,000.

Master of Science in
Oceanography
October 1982

Advisor: G. B. Mills
Department of
Oceanography

MASTER OF SCIENCE
IN
OPERATIONS RESEARCH

COMPUTATIONAL ADVANCES IN THE SOLUTION OF LARGE-SCALE
SET COVERING AND SET PARTITIONING PROBLEMS

Dan O. Bausch
Captain, United States Marine Corps
B.A., Rice University, 1976

The Set Covering Problem (SCP) and the Set Partitioning Problem (SPP) represent an important class of all-binary (0-1) Integer Linear Programs (ILP). A review of the literature reveals extensive application of the SPP/SCP model to a wide set of practical problems. The basic model is explained, and then many of the actual applications of this powerful model discovered in the literature review are discussed. The problems derived from these applications are difficult to solve with any method, and are particularly difficult to solve with optimal or exact algorithms. Various solution techniques are investigated within the framework of the classical simplex method with branch and bound enumeration. Several reformulations of the SPP/SCP as Integer Generalized Networks are examined. Extensive computational results are reported for several "real world" large-scale problems, and a convenient, compact format for data input is proposed as a standard for this problem class.

Master of Science in
Operations Research
October 1982

Advisor: G. G. Brown
Department of
Operations Research

A HIGH RESOLUTION AMMUNITION RESUPPLY MODEL

Peter J. Bucha
Captain, United States Army
B.S., United States Military Academy, 1972

Thomas J. McGrann
Captain, United States Army
B.S., United States Military Academy, 1972

This thesis presents a computer simulated model of ammunition resupply in a U.S. combat battalion. The model is based on current ammunition resupply doctrine and has been designed as a stand-alone simulation. Additionally, this model has been structured to parallel the Simulation of Tactical Alternative Responses (STAR) model so that future enhancements might include its full integration into the STAR model. When such an integration is accomplished, the important dimension of combat service support will become an influencing factor in the decision making process at all levels of the combat model.

Master of Science in
Operations Research
March 1982

Advisors: J. K. Hartman
S. H. Parry
Department of
Operations Research

A STUDY OF THE APPLICATION OF THE LOGNORMAL
AND GAMMA DISTRIBUTIONS TO CORRECTIVE
MAINTENANCE REPAIR TIME DATA

Ergam Camozu
Lieutenant Junior Grade, Turkish Navy

The usual mathematical formulation of availability assumes an exponential distribution for failure and repair times. While this is sometimes correct for reliability, it is not likely to be for maintainability. This study was conducted to verify that the lognormal and gamma distributions are suitable descriptors for corrective maintenance repair times, and to estimate the differences caused in assuming an exponential distribution for availability and maintainability calculations when in fact the distribution is lognormal. Forty-six sets of data of electronic and mechanical systems and equipments were analyzed using the methods of probability plotting and statistical testing for distributional assumptions.

Master of Science in
Operations Research
October 1982

Advisor: M. B. Kline
Department of
Administrative Science

AN ASSESSMENT OF THE ROLE OF COAL IN THE
LONG-TERM ENERGY PLAN FOR KOREA

Jin Seob Cha
Major, The Korean Army
B.S., The Korean Military Academy, 1974

During the last two decades, Korean industry has been developed very quickly. Energy consumption also has been increased very rapidly by the growth of industry. These energy requirements should be imported from other countries because Korea has few energy sources. Korean energy consumption depends highly on oil, even though oil has less security of supply and a higher price than other energy sources due to the limitation of oil reserves and the oil cartel. The Korean government wishes to import energy sources with more security of supply and a lower price.

Evaluation of this impact in the long term is approached by studying five issues. These are: (1) Description of energy consumption sectors in Korea; (2) Description of energy resources/production in Korea; (3) Description of energy resource imports in Korea; (4) Description of longterm energy requirements in Korea; and (5) Conclusions and recommendations.

Master of Science in
Operations Research
March 1982

Advisor: D. Whipple
Department of
Operations Research

ESTIMATING SURVIVAL PROBABILITY OR RELIABILITY:
SIMULATION ASSESSMENTS OF THE DELTA METHOD,
JACKKNIFE, AND BOOTSTRAP

Deniz Cora
Lieutenant, Turkish Navy

Three alternative procedures (Delta, Jackknife, Bootstrap) were investigated and compared with respect to their confidence interval estimation of survival probability of a system. Numerical results from simulations are presented in this report.

Master of Science in
Operations Research
October 1982

Advisor: D. P. Gaver
Department of
Operations Research

GRAPHICS SIMULATIONS OF THE POISSON PROCESS

Richard John Davison
Lieutenant Commander, United States Coast Guard
B.S., University of Washington, 1970

This paper presents the results of the development of graphic simulations of stochastic models using a microcomputer. Included are four computer programs simulating situations which are based on an underlying Poisson process. The programs are written in BASIC programming language for an Apple II Plus computer with a minimum of 48K of memory.

Master of Science in
Operations Research
October 1982

Advisor: J. D. Esary
Department of
Operations Research

SEATAG EXTENSION

Francis A. Devereux
Lieutenant, United States Navy
B.S., United States Naval Academy, 1976

The SEATAG EXTENSION will revise and suggest optional and alternative rules for the game SEATAG: A Sea Control Tactical Analysis Game. Alternative rules are proposed for damage assessment, detection, classification, targeting, weapon's effectiveness, and ASMD close in weapon systems. Air-to air combat tables have been revised to include the latest additions to both the United States and Soviet naval aircraft inventories. Optional rules will incorporate electronic warfare, battle damage repair, miniature ship model combat, and use of the Tomahawk cruise missile. All revisions, optional rules, and alternative rules are placed in a pullout section for addition to the SEATAG binder.

Master of Science in
Operations Research
March 1982

Advisor: A. Andrus
Department of
Operations Research

AN EXTENDED MICROCOMPUTER-BASED NETWORK
OPTIMIZATION PACKAGE

Michael Edward Finley
Lieutenant Commander, Supply Corps, United States Navy
B.A., Cornell University, 1973

The capacitated generalized transshipment problem is the most general and universally applicable member of the class of network optimization models. This model subsumes, as specializations, the capacitated and uncapacitated transportation problems as well as the pure network specializations of these models, which include the personnel assignment problem, the maximum flow, and shortest path formulations. The generalized network problem, in turn, can be viewed as a specialization of a linear programming problem having at most two non-zero entries in each column of the constraint matrix. A detailed description is given of the implementation of an efficient algorithm and its supporting data structures, used to solve large-scale, minimum-cost generalized transshipment problems on an Apple II (64K) microcomputer. A suite of advanced techniques for managing minimum-cost network flow models and inherent data elements will also be discussed.

Master of Science in
Operations Research
October 1982

Advisor: G. G. Brown
Department of
Operations Research

THE IMPACT OF MOTION AND MOTION SICKNESS ON HUMAN PERFORMANCE
ABOARD MONOHULL VESSELS AND SURFACE EFFECT
SHIPS: A COMPARATIVE STUDY

Mark A. Fisher
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

The primary objective of this report is to present and analyze those studies that have been conducted to determine the effects of motion and motion sickness on human performance aboard vessels at sea. To accomplish this, a comparison between the motions experienced aboard several types of monohull vessels and the simulated motions of a 2,000 ton generic surface effect ship will be made. Background information concerning motion sickness and recommendations for future studies are also presented.

Master of Science in
Operations Research
October 1982

Advisor: D. E. Neil
Department of
Operations Research

A SYSTEMS ANALYSIS OF THE COUNTERFORCE
POTENTIALS MODEL

William P. Fox
Captain, United States Army
B.S., United States Military Academy, 1973

This thesis investigates the Counterforce Potentials model as a tool for decision makers in force mix analysis. All theoretical forms and submodules methodology flow within the model are reviewed, criticized, and analyzed for the model's use in force mix analysis. As a linear model for inputting values to weapon systems it is compared to other linear model forms currently used in large scale models. Numerical sensitivity analysis is applied to answer the key questions of the model's characteristics and reaction to various input changes. The analysis reveals that the model has significant flaws which make it questionable for use in force mix analysis.

Master of Science in
Operations Research
October 1982

Advisor: J. K. Hartman
Department of
Operations Research

A METHODOLOGY FOR THE EVALUATION OF UNIT TACTICAL
PROFICIENCY AT THE NATIONAL TRAINING CENTER

John S. Furman
Captain, United States Army
B.S., United States Military Academy, 1975

Richard L. Wampler
Captain, United States Army
B.S., United States Military Academy, 1972

The evaluation process currently planned for the National Training Center at Fort Irwin, California, is examined and a methodology proposed for evaluating unit tactical proficiency from the data accumulated. The concept of a Training Readiness Profile (TRP) is suggested as a concise method for assisting the Battalion Commander and his subordinates in meeting the training objectives of FM 71-1, FM 71-2, and ARTEP 71-2. This concept is applicable to Armored and Infantry battalions and to their training programs as currently specified under Department of the Army doctrine. This methodology is compatible with the automated information retrieval systems currently being specified for installation at the National Training Center.

Master of Science in
Operations Research
March 1982

Advisors: S. H. Parry
MAJ J. L. Ellis
Department of
Operations Research

MULTIVARIATE ANALYSES OF AFLOAT SUPPLY PERFORMANCE
AND AIRCRAFT READINESS DATA

Stephen Wayne Guion
Lieutenant Commander, United States Navy
B.E., Vanderbilt University, 1974

The impact of afloat Supply Support Effectiveness on Aircraft Readiness has become a topic of increased visibility and attention to military planners and policy-makers, yet relatively few research analysis efforts have been directed toward discovering which elements of aircraft carrier supply performance are the most closely related to aircraft Mission Capability concepts and measures.

In this report, the logistic support data base maintained by the Force Supply Staff of COMNAVAIRPAC is analyzed. Using well-known multivariate regression analysis techniques, the relationships between the performance variables and aircraft readiness variables are examined to find a statistically significant combination of variables that are representative of both aviation supply support and aircraft readiness. Based on the results presented, the conclusion is made that the number of off-ship requisitions (backorders) is the variable which provides the direct link between aircraft readiness and supply performance.

Master of Science in
Operations Research
October 1982

Advisor: D. P. Gaver
Department of
Operations Research

SOME COMPUTER ALGORITHMS TO IMPLEMENT
A RELIABILITY SHORTHAND

Sadan Gursesl
Lieutenant Junior Grade, Turkish Navy

Under the assumption of constant failure rates it is possible to build a "reliability shorthand" which gives a simple, unified approach to reliability computations for systems in the presence of complications like support by shared spares or changes in the failure rates of surviving components when other components fail. The computational implementation of the shorthand depends upon the convolution of strings of exponentially distributed random variables.

This paper presents an algorithm for the numerical convolution of exponentially distributed random variables. After reducing the system scenario to its shorthand format, one can use the programs that are given in the appendix to obtain numerical values for the reliability of the system.

Master of Science in
Operations Research
October 1982

Advisor: J. D. Esary
Department of
Operations Research

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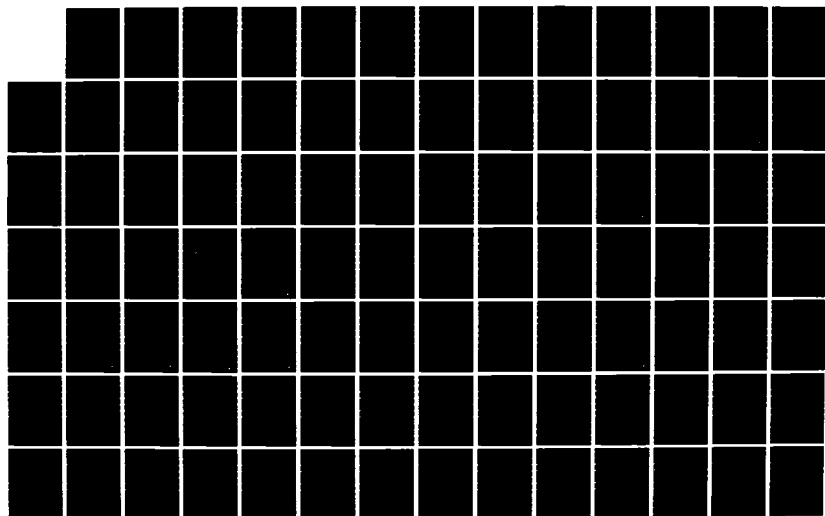
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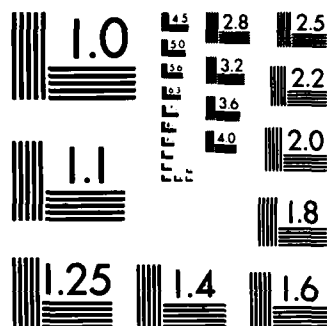
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AN APPLICATION OF DISCRIMINANT ANALYSIS TO THE CONSTRUCTION
OF A PERFORMANCE INDEX FOR MARINE OFFICERS

William Joseph Haffey
Captain, United States Marine Corps
B.S., The Ohio State University, 1972

This study consists of a discriminant analysis of composite marks for 23 selected categories in section B of the Marine Corps fitness report. The data for the study were taken from all the fitness reports on record for those officers in the grades of Captain, Major, and Lieutenant Colonel who appeared before promotion boards during FY81.

Discriminant scores were computed for all officers of a particular grade and those officers were then ranked according to this score. It is shown that this ranking closely approximates a ranking by quality and so proves the discriminant score to be a viable performance index, a term whose definition and background are covered in the thesis.

Finally, the unique applicability of the discriminant analysis technique to the performance index problem is demonstrated. While generally unaffected by the distribution of marks within a category, the weight assigned to each category in the discriminant function is very much influenced by the consideration given that category when the promotion decision is made.

Master of Science in
Operations Research
March 1982

Advisor: H. J. Larson
Department of
Operations Research

AN ANALYSIS OF MODELS FOR FORECASTING
REPAIRABLE CARCASS RETURNS

Douglas Martin Hartman
Lieutenant Commander, Supply Corps, United States Navy
B.S., Ohio State University, 1971

This thesis evaluates techniques for forecasting the return of failed repairable spare parts (known as carcasses) within the U.S. Navy supply system by comparing the model currently implemented in the Uniform Automated Data Processing System Inventory Control Point (UICP) program with several alternative forecasting models to determine if an improvement can be achieved in forecasting effectiveness. The current model uses an exponential smoothing procedure and applies several filtering processes to determine the appropriate smoothing constant value. The alternative models employ forecasting techniques such as moving average, moving least squares, adaptive response rate, and regression analysis. Each model is then synthesized with actual U.S. Navy supply system data and its performance measured by a set of evaluation criteria. The results indicate that the current UICP forecasting model cannot be improved substantially and that a filtering process is critical to the performance of any model applied to real world data.

Master of Science in
Operations Research
October 1982

Advisor: F. R. Richards
Department of
Operations Research

ELECTRONIC WARFARE MODULE OF THE SIMULATION OF TACTICAL
ALTERNATIVE RESPONSES (STAR) MODULE

Ambrose Robert Hock
Captain, United States Army
B.S., United States Military Academy, 1974

Stephen Lamar Maddox
Captain, United States Army
B.S., United States Military Academy, 1973

This thesis represents an analysis of the effects of Electronic Warfare (EW) on the outcome of a battle from the high resolution combat simulation model STAR (Simulated Tactical Alternative Responses). The analysis was performed on data generated by the STAR model. An overview of the STAR model and an explanation of the EW model used is included to provide a good background with which to understand the analysis performed. Conclusions resulting from the analysis and enhancements to the EW model are presented along with recommendations for future analysis of the EW model.

Master of Science in
Operations Research
March 1982

Advisor: A. L. Schoenstadt
Department of
Mathematics

A GRAPHICAL TEST BED FOR ANALYZING AND REPORTING
THE RESULTS OF A SIMULATION EXPERIMENT

David George Linnebur
Captain, United States Marine Corps
B.A., Saint Mary of the Plains College, 1975

A graphical test bed in which the results of a simulation experiment can be reported and analyzed is described. The test bed is based on the regression adjusted graphics and estimation (RAGE) methodology developed by Heidelberger and Lewis (Ref. 1) for regenerative simulations. From the graphics and the associated numerics the experimenter can summarize and see simultaneously relative properties, such as bias, normality and standard deviation, of several estimators of a characteristic of a population for up to eight sample sizes. The graphics is supported on a line printer to make it and the program portable.

Master of Science in
Operations Research
March 1982

Advisor: P. A. W. Lewis
Department of
Operations Research

AN EXAMINATION OF THE UNITED STATES AIR FORCE OPTIMAL
NONNUCLEAR MUNITIONS PROCUREMENT MODEL

Paul H. Lord
Captain, United States Marine Corps
B.S., State University College at Oneonta, New York, 1974

This evaluates the United States Air Force (USAF) Nonnuclear Armament Program (NAP) models and specifically the Heavy Attack (HA) model. Particular attention is paid to the optimization techniques incorporated in Heavy Attack, to the validity of the inputs being optimized, and to the implications of underlying model assumptions. An examination is made of the validity of using target values as model inputs for not only the beginning of a conflict, but also for times extending into the conduct of a conflict. New technology has been applied to the problem and the success achieved is reviewed. Reformulations aimed at improving model capabilities and/or solution speeds are described.

Master of Science in
Operations Research
October 1982

Advisor: G. G. Brown
Department of
Operations Research

AN INVESTIGATION OF A STEADY STATE, ALLOCATION MODEL
FOR MILITARY MANPOWER PLANNING

Joseph Nathaniel Lott
Captain, United States Marine Corps
B.I.E., Auburn University, 1976

The problem of allocating different types of jobs among several classes of military manpower is becoming increasingly more important as military jobs grow more specialized. A model was proposed by Richard C. Grinold which constructs a personnel inventory by rank for each of several classes of manpower and then allocates that inventory to meet billet requirements. The model is designed for long-range planning purposes and produces possible inventory based on an optimization scheme that sets permitted errors in the allocation. The thesis presents a review and demonstration of the model based on the U.S. Navy officer corps, a discussion of implementation considerations, and further work on optimization schemes.

Master of Science in
Operations Research
December 1981

Advisors: P. R. Milch
K. T. Marshall
Department of
Operations Research

THE ENGINEER EFFECTS MODULE FOR THE STAR COMBAT MODEL

Stephen C. Main
Captain, United States Army
B.S., United States Military Academy, 1972

James V. Mudd
Captain, United States Army
B.S., United States Military Academy, 1974

This thesis presents an Engineer Effects Module for the Simulation of Tactical Alternative Responses (STAR) combat model. The effects of engineer obstacles on the combat process are important, and the STAR combat model previously lacked the capability to model these effects. Implicit in the construction of the model is the task of modelling the obstacles followed by the simulation of the synergistic effects of the obstacles on the combat commander's actions. The Engineer Effects Module is executed in the SIMSCRIPT II.5 programming language. This thesis serves as both the implementation and running instructions for the Engineer Effects Module for the STAR model.

Master of Science in
Operations Research
March 1982

Advisor: J. K. Hartman
Department of
Operations Research

TACTICAL MOTION ANALYZER (TMA)

Jack Woodward McCorkle, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

This thesis is a two player, microcomputer controlled, tactical motion analyzer (TMA) of unit movements. TMA is designed to be used in either a manual or computer driven wargame. Written in the computer language Pascal, implementation is designed for the APPLE II computer. The program is contained on two, 5 inch floppy diskettes. Specific unit characteristics are entered into the database by the users. Users may then analyze unit movements using time-step simulation. Data transfer between computers is done by the users physically exchanging diskettes. The game may be replayed or saved and continued at any time. The program logic and data manipulation are discussed in detail within the text of the thesis.

Master of Science in
Operations Research
October 1982

Advisor: A. F. Andrus
Department of
Operations Research

DETERMINISTIC AGGREGATED MODEL OF STAR ON THE
APPLE COMPUTER (DAMSTAC)

Charles J. McKenzie III
Captain, United States Army
B.S., Clemson University, 1971

Thomas J. Pawlowski III
Captain, United States Army
B.S., United States Military Academy, 1972

This thesis investigates the estimation of Lanchester attrition-rate coefficients in a deterministic aggregated combat model. Numerical values for the attrition-rate coefficients in the Lanchester-type model are taken to be the same as those for a corresponding continuous-time Markov-chain model, and maximum likelihood estimators are developed for these Markov-chain coefficients. A discussion of the historical background of Lanchester's equations preceeds the theoretical development of components of the attrition rate equations. Using the functional forms and procedures developed by Gordon M. Clark in his doctoral thesis, a simple computer simulation program is developed for a short duration battle consisting of homogeneous forces. Recommendations are made to modify this program to model heterogeneous forces in a similar battle. A discussion of the theoretical background supports these recommendations.

Master of Science in
Operations Research
March 1982

Advisor: J. G. Taylor
Department of
Operations Research

RADAR MODEL WITH TERRAIN EFFECTS

James W. Meritt
Lieutenant, United States Navy
B.S., University of South Carolina, 1972

This thesis presents an interactive naval radar model which computes radar detection in the presence of land masses, using a parametric terrain description.

Master of Science in
Operations Research
March 1982

Advisor: J. K. Hartman
Department of
Operations Research

AN APPROACH TO REDUCE SKILL LOSS OF THE UNRESTRICTED
LINE OFFICER IN THE VENEZUELAN NAVY

Mirko Markov Mikas
Commander, Venezuelan Navy
Venezuelan Naval Academy, 1965

The readiness of the Venezuelan Navy relies in part on the skills of its personnel. The Unrestricted Line Officer (URL) is most frequently transferred to nonrelated billets which exposes him to skill loss. This thesis (1) reviews the literature in the area related to skill loss, (2) examines the billet assignment procedure in the Venezuelan Navy, and (3) proposes potential solutions to reduce the skill loss of the Unrestricted Line Officer.

Master of Science in
Operations Research
March 1982

Advisor: W. F. Moroney
Department of
Operations Research

A DAMAGE ASSESSMENT MODEL FOR SURFACE ENGAGEMENT
FOR MISSILE AND GUNFIRE

Mario Ivan Carratu Molina
Commander, Venezuelan Navy
Venezuelan Naval Academy, 1965

This thesis provides a model and computer program for rapid Damage Assessment. It may be used in any War Game between fleets of surface combatants. The effectiveness of conventional weapons in a naval environment depends upon the destructive power of the munitions, the rate of fire at which the munitions can be delivered on the target(s), the range to the target(s), and the reliability of the weapons systems in use. To have a MOE of weapons, the characteristics of the target (e.g., target size, target susceptibility to damage) must also be considered. This model incorporates the above elements for surface naval combatants under missile and gunfire.

The hits on a target are assumed to be distributed uniformly-randomly along a target's length. Target elements (gun mounts, communications propulsion, etc.) are degraded or destroyed according to assigned vulnerability factors. To exercise the model, when experimental data was not available, judgemental inputs were used. The resulting outputs were realistic. The model uses a computer program written in Fortran IV with Monte Carlo features incorporated.

Master of Science in
Operations Research
March 1982

Advisor: CAPT W. P. Hughes, Jr.
Department of
Operations Research

TEMPOA: AN INTERACTIVE SIMULATION FOR THE APPLE-III
MICROCOMPUTER

Christopher D. Owens
Lieutenant, United States Navy
B.S., Marquette University, 1975

TEMPOA is a computer interactive version of the original General Electric TEMPO game, and is written for the Apple III microcomputer. A minimum of two players vie for a strategic 'win' through judicious budgetary planning in the development and procurement of realistic weapon systems. All decisions are subject to the constraints of limited budgets, hardware inventories, research and development time lags and the uncertainties of war and inflation. A third party, assuming the role of game umpire, selects all simulation parameters and oversees the play of the game.

Master of Science in
Operations Research
October 1982

Advisor: A. F. Andrus
Department of
Operations Research

IMPLEMENTATION OF A RELIABILITY SHORTHAND
ON THE TI-59 HANDHELD CALCULATOR

Hans-Eberhard Peters
Major, German Air Force
Dipl.-Betriebsw., Fachhochschule des Heeres I, 1974

It is shown how a reliability shorthand can be implemented on a handheld calculator.

Assuming constant failure rates, basic structures are used to show how the shorthand can be applied. Several examples are worked out that show, how, with component failure rates as input, a handheld calculator can be used to compute the reliability of a system.

Two TI-59 programs are provided as a computational aid.

Master of Science in
Operations Research
October 1982

Advisor: J. D. Esary
Department of
Operations Research

A GAME THEORY APPROACH TO SEARCH

Clark Wallis Pritchett
B.S., George Washington University, 1965

A model of search of an area is developed using the probability of detection as the measure of effectiveness. The area is partitioned into two pieces. Two search units, with different capabilities, attempt to detect one evader. If the search efforts of the two units do not overlap, the probability of detection is the same no matter how the area is partitioned. An approach based upon Game theory is also developed. The variance of the probability of detection is computed and used to select strategies for searching.

Master of Science in
Operations Research
October 1982

Advisor: G. F. Lindsey
Department of
Operations Research

A SYSTEMS APPROACH TO CONTINGENCY MODELLING

Thomas H. Riddle
Captain, United States Army
B.S., West Virginia University, 1977

Thomas L. Snyder
Captain, United States Army
B.S., United States Military Academy, 1974

This thesis presents an architecture to be used in an automated methodology for the validation of operations plans (OPLANS). The approach used high resolution stochastic and deterministic simulation to model the activities of implementing a contingency plan. Operations are divided into three distinct major areas; Mobilization, Deployment, and Employment. Each of these major areas is modelled by a series of modules which depicts the activities and processes which take place during the operation. The use of this approach for analysis of contingency plans provides the capability for updating and reevaluation of joint OPLANS.

Master of Science in
Operations Research
October 1982

Advisor: J. K. Hartman
S. H. Parry
Department of
Operations Research

A NAVY OFFICER ASSIGNMENT MODEL

Thomas Gordon Russell
Lieutenant Commander, United States Navy
B.A., Grinnell College, 1968

A model using Automatic Data Processing is presented which aids in reducing the bookkeeping and administrative load involved in the current U.S. Navy Officer Assignment Process. The present system is described in detail. An interactive model, written in APL, is introduced which will assist Assignment (Detailers) and Placement Officers in their work. The programs permit Detailers to view an officer's record, see the list of officers available for transfer, propose an officer for a specific billet, review the status of the proposals made and review the billets which have been advertised as requiring to be filled (posted). The placement Officer can review a command's allowances, review a command's manning and personnel, advertize (post) a billet to be filled, make an officer available for transfer, review the billets he has posted and the officers he has made available, and act on a proposal.

Master of Science in
Operations Research
March 1982

Advisor: P. R. Milch
Department of
Operations Research

SEARCH AND RESCUE RESOURCE ALLOCATION
USING THE $M/E_k/c$ QUEUE

Herbert H. Sharpe
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1975

Justification is provided for modelling the arrival and subsequent disposition of distress cases at a Coast Guard Search and Rescue Station as an $M/E_k/c$ queue. Numerical tables and a simple computational method are presented which provide convenient and accurate steady state solutions to this system assuming first in first out queue discipline. Specific measures of effectiveness computed include the delay probability, average queue length, average number in system, average waiting time, average time in system, and the distribution of waiting time. Additionally, the consequences of considering a preemptive priority queue discipline with two priority classes are investigated and a method of calculating the delay probability for this priority scheme is proposed.

Master of Science in
Operations Research
October 1982

Advisor: P. R. Milch
Department of
Operations Research

AN ANALYTICAL APPROACH FOR ASSESSING VULNERABILITY
TO COUNTERFIRE

Keith F. Snider
Captain, United States Army
B.S., United States Military Academy, 1976

An analytical approach for assessing the vulnerability of an artillery battery in terms of the probability that the battery receives counterfire is developed. This approach is based on a simplified model that estimates the probability of detection by indirect fire weapons locating systems of artillery weapons firings, and on recent work by the Mitre Corporation in determining probabilities of counterfire on the basis of battery exposure times and enemy counterfire response times. An illustrative example is given to demonstrate the approach, and parametric variations are performed to investigate the impact of changing tactics and weapons characteristics.

Master of Science in
Operations Research
October 1982

Advisors: J. G. Taylor
S. J. Paek
Department of
Operations Research

AN OPTIMIZATION APPROACH TO STUDY THE
DISTRIBUTION OF THE COEFFICIENT
OF DETERMINATION, R^2

Jeffery Donald Vick
Captain, United States Marine Corps
B.S., University of Minnesota, 1976

The empirical model builder utilizing regression techniques frequently relies on the coefficient of determination, R^2 , to measure "goodness of fit". Costing and pricing analysts using such variable selection techniques frequently encounter inflated R^2 values. This paper examines the space within which the regression model operates and presents practical optimization algorithms to help assess the amount of confidence that can be placed in R^2 for a particular set of candidate predictor variables. The algorithms describe a technique using linear programming to find the lowest value of R^2 possible using the given set of data.

Master of Science in
Operations Research
October 1982

Advisor: G. T. Howard
Department of
Operations Research

AN APPLICATION OF RAYLEIGH CURVE THEORY TO
CONTRACT COST ESTIMATION AND CONTROL

Harry Watkins III
Lieutenant, United States Navy
B.S., University of Louisville, 1976

Cost growth is a major problem in defense systems acquisition. Since 1969 the DOD has underestimated the ultimate costs of major systems by more than 50 percent. Consequently, the importance of contract costs has risen greatly in recent years to the point that costs are now officially equated to technical performance in importance. A body of knowledge of the structure and models of the behavior of contract costs and contract performance within DOD is desired. This paper develops a simplified methodology for the systematic analysis and prediction of cost and schedule variables from an existing data base. The methodology is applied to actual DOD contract data using the interactive computing system MINITAB.

Master of Science in
Operations Research
March 1982

Advisor: D. C. Boger
M. G. Sovereign
Department of
Operations Research

PROPOSALS FOR THE EVALUATION OF PERSONNEL READINESS
DURING A COMPANY INSPECTION IN THE GERMAN ARMY

Reinhard Weber
Captain, German Army

This thesis suggests criteria necessary for the assessment of personnel readiness in the West German Army. They should make the effort to achieve personnel readiness more efficient and the evaluation process more objective.

The proposed physical criteria are the degree of deviation from the authorized strength, the degree to which the military occupational specialities are achieved and the availability of leaders and rank and file for essential training. Proposed psychological criteria include handling of disciplinary power by the company commander and the subjects of complaints, enlistment and reenlistments. Consideration was also given to the subjects of personnel turnover, civic education and leadership and social factors.

Where required, the historic and legal motivation for the criteria is elaborated and suggestions are made for determining the actual content and weight of the criteria according to their influence on readiness for different unit types.

Master of Science in
Operations Research
October 1982

Advisor: D. E. Neil
Department of
Operations Research

AN INTERACTIVE MICROCOMPUTER WARGAME FOR AN AIR BATTLE

James Owen Wilson
Lieutenant, United States Navy
B.A., University of Texas, 1974

This thesis is an interactive wargame using an APPLE III microcomputer (128K configuration) programmed in UCSD PASCAL. It is designed as a naval task force undergoing an air attack and is modeled from the Air Battle Analyzer by M. C. Waddell of the Johns Hopkins University Applied Physics Laboratory.

Master of Science in
Operations Research
October 1982

Advisor: A. F. Andrus
Department of
Operations Research

DISTRIBUTIONAL ANALYSIS OF INVENTORY
DEMAND OVER LEADTIME

Mark Lee Yount
Lieutenant Commander, Supply Corps United States Navy
A.B., Earlham College, 1968
M.A., University of Colorado, 1971

The distribution of inventory demand over procurement leadtime is modeled using mixed probability distributions that explicitly account for the high incidence of zero demands observed in Inventory Control Point Demand History Files. Analysis was limited to the right-hand tail area of the distribution on the assumption that that area is of critical importance in determining the effectiveness of an inventory system. Probabilistic models studied were: 1) Bernoulli-exponential, 2) Bernoulli-lognormal, and 3) Bernoulli-logistic. These compound distributions were compared to several standard distributions including the Poisson, negative binomial and normal distributions using a resampling procedure appropriate in cases such as this where a paucity of data exists. Fits obtained from the 75th to 95th percentiles indicated the mixed distributions may be superior as a class to the standard distributions for high demand items.

Master of Science in
Operations Research
June 1982

Advisor: C. F. Taylor, Jr.
Department of
Operations Research

MASTER OF SCIENCE
IN
PHYSICS

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REAL GAS CONSIDERATIONS FOR DETERMINING PHYSICAL AND THERMODYNAMIC
PROPERTIES OF GASSES INVOLVED IN THE PREDICTION OF
THE EFFECTS OF INTERNAL EXPLOSIONS

Lewis Keith Athrow
Lieutenant Commander, United States Navy
B.S., University of Idaho, 1969

An investigation into the thermodynamic properties of gaseous magnesium, aluminum and their oxides has been conducted to determine the validity of assuming ideal-gas-law behavior in confined explosions when these metals are present. A number of vapor phase equations of state were tested and compared. The paucity of experimental and rigorous theoretical data mandated the use of an equation of state that would provide realistic results and yet be tolerant of reasonable variations in the estimation of necessary parameters. The parameters selected are the vapor phase critical constants, which have been estimated from the theory of corresponding states or from partition function calculations.

Using the Dieterici equation, which proved satisfactory in terms of the two criteria given above, it was determined that deviation from ideal gas behavior was insignificant except in the case of metal oxides, which may have a determinable effect on the equilibrium conditions of the explosion products.

Master of Science in
Physics
June 1982

Advosor: R. A. Reinhardt
Department of
Physics

POWER SPECTRA OF GEOMAGNETIC FLUCTUATIONS
BETWEEN 0.02 AND 20 Hz

Michael Wayne Beard
Captain, United States Army
B.S., United States Military Academy, 1971

Fluctuations of the East-West component of the Earth's geomagnetic field were measured at a remote land site. The resulting data were transmitted by a solar powered telemetry system to the Naval Postgraduate School at Monterey, California, and the power spectra for the frequency range of .02 - 20 Hz calculated. The measurements, which covered a 4-month interval (July 20 - October 10, 1981), consistently show a minimum of activity in the interval 3 - 7 Hz. At frequencies below the minimum, in the range of .02 - 3 Hz, the typical monotonic decrease in background activity with frequency was observed. At 1 Hz an average power spectral density of 1×10^{-2} nT²/Hz was observed during the day and 3.1×10^{-3} nT²/Hz at night. In contrast, at frequencies above the minimum, in the range 7-14 Hz, the activity is dominated by the first Schumann resonance. An evaluation of the East-West component spectra and concurrent underwater horizontal component measurements showed a 90% correlation with the underwater spectra. The underwater field strengths were normally 3-5 dB less than the strengths measured on land. Splitting of the first Schumann resonance peak into a doublet structure was observed in 10% of the land data.

Master of Science in
Physics
December 1981

Advisor: O. Heinz
Department of
Physics

A STUDY OF THE BREAKDOWN MECHANISM OF ASI 304 STAINLESS STEEL.
TYPE 2024 ALUMINUM AND VARIOUS TITANIUM COATINGS

Michael Howard Beelby
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

Henry George Ulrich, III
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

An investigation, experimental and theoretical, into the breakdown mechanisms and associated minimum power levels required for the breakdown and unipolar arcing was conducted for AISI 304 stainless steel and Type 2024 aluminum. The experiment was conducted using a neodymium-glass Q-switched laser. A system of filters was used to attenuate the irradiance on target to the point at which no damage was discernible following laser-target interaction.

Experimental results show that above a certain critical power density, surface breakdown occurs. The primary mechanism of surface damage at the power density threshold is by unipolar arcing.

Titanium coated stainless steels were exposed to energy density levels on the order of 5 GW/CM^2 . The titanium coatings significantly reduced or eliminated the number of unipolar arcs observed.

A model is proposed for the physical processes involved in the first few nanoseconds before breakdown.

Master of Science in
Physics
December 1981

Advisor: F. Schwirzke
Department of
Physics

ATMOSPHERIC EFFECTS ON ULTRA HIGH
FREQUENCY RADIO PROPAGATION

Joseph Clent Boudreaux, III
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

The dependence of received power on range within and below atmospheric ducts was measured in conditions of elevated, nonhomogeneous, multilayered ducts. An aircraft with UHF transmitter covered the range 0 to 150 nm. from a shore based receiver. Range dependent maxima and minima in received power were detected at the surface in elevated duct conditions. The results were compared to predictions from ray, waveguide multi-mode, and single mode theories. Ray and single node theories were inadequate to predict power patterns over the horizon. Multi-mode theory yielded qualitative agreement for conditions of deep, low elevated ducts. Agreement for higher, thinner ducts was poor. Multilayered duct systems were observed and produced interference patterns without recognizable period with range.

Master of Science in
Physics
June 1982

Advisor: G. E. Schacher
Department of
Physics

STIMULATED CERENKOV RADIATION PRODUCED BY 100 MeV ELECTRONS

Leslie John Brown
Lieutenant, United States Navy
B.S., Kansas University, 1974

It is proposed that electromagnetic radiation of a specified frequency can be produced by stimulated Cerenkov radiation in a dielectric resonator excited by a relativistic electron beam. The frequency generated depends upon the energy of the electrons and the refractive index and dimensions of the dielectric. This work describes the continuation of an experiment designed to verify the proposed radiation using 100 MeV electrons and a polyethylene slab. Problems encountered during the experiment are discussed and suggestions for continuing work are provided. Radiation is produced at several discrete frequencies, which are harmonics of the electron bunch frequency as produced by the LINAC. The absence of modes at the resonant frequency of the dielectric is understandable, considering the short length of the resonator. When the limitations imposed by the physical dimensions of the dielectric slab are considered, the results support the prediction.

Master of Science in
Physics
December 1981

Advisor: F. R. Buskirk
Department of
Physics

SCINTILLATION ANALYSIS OF GAMMA RADIATION
WITH CRYSTALS OF BISMUTH GERMANATE

Robert R. Cooke
Captain, United States Army
B.S., Northeastern University, 1972

This report provides an introduction to the theory of scintillation counting and analysis of nuclear radiation, with particular attention to an application for bismuth germanate ($\text{Bi}_4\text{Ge}_3\text{O}_{12}$), or BGO, Scintillator crystals.

Radiation damage experiments using 100 MeV electrons from a linear accelerator were conducted to evaluate the induced radiation and subsequent resolution capability of bismuth germanate and thallium activated sodium iodide scintillators. It was shown that BGO has much higher resistance to radiation damage from electron and photon activation sources.

Master of Science in
Physics
October 1982

Advisor: F. R. Buskirk
Department of
Physics

INSTRUMENTAL PHOTON ACTIVATION ANALYSIS USING THE LINEAR
ACCELERATOR AT THE NAVAL POSTGRADUATE SCHOOL

Wayne Alan Fisher
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1977

Charcoal, charcoal residue, potting soil, aluminum foil, bismuth germanate, and petroleum samples have been investigated using instrumental photon activation analysis (i.e., no radiochemistry). The major and minor elements routinely observed by this nondestructive method were: C, Cl, Ca, Fe, Mg, Si, and K. A comprehensive review of the principles of IPAA was also included in the study. The principles were applied to a theoretical analysis of an oil sample in which the trace element concentrations were known. It was concluded that IPAA is a highly sensitive technique which could be used to fingerprint oils.

Master of Science in
Physics
October 1982

Advisor: F. Buskirk
Department of
Physics

OPTICAL SCINTILLATION MEASUREMENTS FOR
SINGLE AND FOLDED PATHS

Thomas Joseph Hodgini
Captain, United States Army
B.S., United States Military Academy, 1973

A method of measuring scintillation of two laser beams propagating along single and folded optical paths has been devised, tested, and satisfactorily utilized. The system was utilized experimentally to verify theoretical predictions of the correlation of the two paths as a function of the relative path geometry. The apparatus utilized alternating optical pulses from the two paths. The detection system employed two signal processing channels with electronic switching to permit sampling alternating source pulses with a time separation of 0.30 milliseconds. Several equipment trials and one field experiment were conducted. The results demonstrated good correlation with the theory previously developed in an accompanying project.

Master of Science in
Physics
March 1982

Advisor: E. C. Crittenden, Jr.
Department of
Physics

THE CONSTRUCTION OF A Nd:YAG LASER

Jin Won Jung
Lieutenant Colonel, Korean Army
B.S., Korean Military Academy, 1967

A neodymium laser was constructed with a locally designed circular cylindrical pumping cavity. Laser action was achieved under conditions predicted.

A Nd:YAG crystal was selected for use in the laser, and the physical and chemical properties of Nd:YAG as compiled from the literature presented. The theoretical and experimental approach for designing the Nd:YAG laser system, and a detailed description of the laser system are given, with the expected operational characteristics extrapolated from measurements on a commercial laser.

After a series of the tests, lasing action was observed at the input power of 3.6 kw. The efficiency of the output power to input was found to be 0.04% (slope) or 0.008% overall, approximately 20% of the values for a comparable commercial laser. The low laser efficiency is ascribed to low cavity pumping efficiency and inadequate cooling. Recommendations are made for improvement of system performance.

Master of Science in
Physics
June 1982

Advisor: A. W. Cooper
Department of
Physics

AN INVESTIGATION OF ENERGY COUPLING IN VARIOUS
ARC SUSCEPTIBLE AND RESISTANT CONDUCTORS

Robert Morton Metheny
Captain, United States Army
B.S., United States Military Academy, 1974

Thermal energy and momentum coupling to four target materials was investigated to determine what effect unipolar arcing had on the coupling process. A review of the various mechanisms of energy coupling to targets irradiated by laser energy, including unipolar arcing, is presented along with some previous experimental results. The experiments were conducted in a 10^{-6} torr. vacuum using a neodymium-glass laser in the Q-switched mode.

Unipolar arcing was seen to occur on tantalum and SS 304 targets, but not on the Tic and TiN coated targets. Thermal coupling was higher in the arc prone targets, while the listing of materials in increasing order of momentum coupling varied through the intensity range under consideration. Unipolar arcing is proposed as a possible mechanism for the increased thermal coupling. The inability to determine accurately the amount of target material removed by the unipolar arcing process prevented any definitive statement of its effect on momentum coupling.

Master of Science in
Physics
June 1982

Advisor: F. R. Schwirzke
Department of
Physics

A FIELD VISIBILITY COMPARISON BETWEEN ELECTROLUMINESCENT SOURCES
AND STANDARD U.S. COAST GUARD INCANDESCENT
AIDS-TO-NAVIGATION SOURCES

John Richard Thacker
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1976

The U.S. Coast Guard has traditionally relied on incandescent sources for lighted aids-to-navigation. However, incandescent sources suffer from scintillation, halo effects, catastrophic failure, and other problems. Electroluminescence (EL) may offer some advantages in overcoming these difficulties.

From approximately 1.3 miles distant, sixteen observers made simultaneous brightness comparisons between EL and selected standard incandescent aids-to-navigation sources for both red and green colors. In addition, a test was conducted to determine if any of several spatial arrangements of EL panels were perceived as brighter. Green EL sources seemed to perform better than predicted, consistently brighter than their incandescent counterparts. The spatial arrangement test indicated that no statistically discernable difference existed in perceived EL brightness in any of the tested panel arrangements.

Master of Science in
Physics
October 1982

Advisor: S. H. Kalmbach
Department of
Physics

MASTER OF SCIENCE
IN
SYSTEMS TECHNOLOGY
ANTISUBMARINE WARFARE
(ASW)

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MARINE ATMOSPHERIC BOUNDARY LAYER
AND INVERSION FORECAST MODEL

David Almy Brower
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

A computer code for prediction of the marine atmospheric boundary layer is developed. The code is used to predict changes of the capping inversion height, the strength of the specific humidity and potential temperature 'jumps' at the inversion, the well-mixed relative humidity in the layer and the lifting condensation level for possible cloud/fog formation. The code is based on recently formulated integrated models for the clear or cloudy marine planetary boundary layer capped by an inversion. The initialization is based on radiosonde data and, as such, the code was developed to be used with the Integrated Refractive Effects Prediction System (IREPS) assessment code. It has been extended to be used with any single platform having atmospheric sensing capabilities, radiosonde or dropsonde. IREPS and, hence, the MABL prediction code are under consideration for inclusion in Tactical Environmental Support System (TESS).

Master of Science in
Systems Technology (ASW)
March 1982

Advisor: K. L. Davidson
Department of
Meteorology

SATELLITE APPLICATIONS TO ACOUSTIC PREDICTIONS SYSTEM

Stephen A. Cox
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Predicting the thermal structure of the oceans is of importance to the naval tactician, logistician, or search and rescue coordinator. Understanding the structure of the oceans provides valuable insights to those who must utilize the oceanic environment effectively in their day to day operations.

Today, recent information about an area is limited to point observations of single bathythermographs. Few models produce an accurate picture of the ocean environment that can be used for updating tactics to conform to a changing situation. Producing a reliable prediction of conditions for a large area, while using limited resources, is the basic objective of this paper.

Satellite infrared imaging of the ocean surface has been used effectively to map sea surface temperature patterns. Such sea surface temperature patterns can be used, along with climatology, to identify subsurface thermal structure in an ocean area according to results of this study. More accurate inputs can be made to range dependent acoustic prediction models, thus improving the ASW environmental predictions available to fleet users.

Master of Science in
Systems Technology (ASW)
October 1982

Advisor: G. H. Jung
Department of
Oceanography

AN ANALYSIS OF THE EFFECTIVENESS EVALUATION PROCESS
FOR VP ANTISUBMARINE WARFARE FLEET REPLACEMENT
SQUADRON AIRCREW TRAINING

Bruce W. Crawford
Lieutenant Commander, United States Navy
B.S., Kansas State College of Pittsburg, 1971

During January 1979 VP-31, the West Coast P-3 Fleet Replacement squadron, implemented an Instructional System Development based training program to replace their traditional training program. Due to monetary, manpower, and time constraints, the evaluation phase of the new training program was not completely developed or implemented. This thesis examines the current status of the external evaluation portion of the new training program in an attempt to determine the feasibility of its completion and implementation. The external evaluation plan is related to the Interservice Procedures for Instructional System Development Model. From this analysis, a better understanding of the plan is gained and recommendations for an improved external evaluation program and training system are presented.

Master of Science in
Systems Technology (ASW)
October 1981

Advisor: D. E. Neil
Department of
Operations Research

SH-3 HELICOPTER/GLOBAL POSITIONING SYSTEM
INTEGRATION ANALYSIS

Robert Howard Hart
Lieutenant, United States Navy
B.E.C.S., University of New Mexico, 1975

The Global Positioning System (GPS), the transmitted navigational signal, and the overall acquisition approach are explained. Navigational receiver components are functionally described and the hierarchy of platform integration and capability is discussed. Specifically explored is the integration of GPS into the Sikorsky SH-3 Helicopter. Performance comparisons of the medium versus high dynamic receiver, based solely on preliminary simulation data, indicate that at this time the medium dynamic receiver is the optimum configuration. Elimination of the doppler radar in lieu of the five channel receiver would only be possible after thorough over-water testing of the high dynamic set. The actual velocity accuracy of GPS receivers in a hovering helicopter is the main question yet to be answered. The overall mission effectiveness of the GPS equipped SH-3 Helicopter should be significantly improved because of an accurate, stand-alone navigation system.

Master of Science in
Systems Technology (ASW)
October 1982

Advisor: R. N. Forrest
Department of
Operations Research and
ASW Academic Group

APPLICATION OF THE SONAR EQUATIONS TO
BISTATIC ECHO-RANGING

Lawrence Michael Harvey
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

The thesis explores the phenomena unique to echo-ranging with a source widely separated from the receiver. In an asset-austere era of antisubmarine warfare, this technique serves as a tactical advantage, particularly in the passive tracking of a submarine. Particular emphasis is placed on the terms of the sonar equation most affected by the bistatic geometry: Reverberation level and target strength. The research is particularly applicable to ongoing NATO and Naval Laboratory work involving the bistatic concept in array design and for use with surface escorts in conjunction with friendly submarines.

Master of Science in
Systems Technology (ASW)
March 1982

Advisor: A. B. Coppens
Department of
Physics

EVALUATION OF GEOMAGNETIC ACTIVITY IN THE MAD FREQUENCY
BAND (.04 to 0.6 Hz)

Jeffrey Mark Schweiger
Lieutenant, United States Navy
S.B., Massachusetts Institute of Technology, 1975

After defining geomagnetic noise as it applies to MAD, the geomagnetic indices currently used by the fleet to predict MAD geomagnetic noise are reviewed to determine their actual applicability. The current indices are determined to be insufficient, methods are proposed for establishing a new MAD index, and a developmental MAD index system was tested. Geomagnetic fluctuations in the .04 to 2.0 Hz frequency band were recorded at Monterey, California, and used for a preliminary test of the proposed MAD index.

Master of Science in
Systems Technology (ASW)
October 1982

Advisor: O. Heinz
Department of
Physics

MASTER OF SCIENCE

IN

**SYSTEMS TECHNOLOGY
COMMAND, CONTROL AND
COMMUNICATIONS (C3)**

TACTICAL SITUATION DISPLAYS AND FIGURATIVE SYMBOLOGY

Lawrence Alan Bruck
Major, United States Air Force
B.S., University of Texas, 1968
M.S., State University New York Binghamton, 1979

Philip Wayne Hill
Captain, United States Air Force
B.S., United States Military Academy, 1973

This thesis investigates the utility of figurative symbology for tactical situation displays. The purpose was to determine if more descriptive symbology--figurative symbology or use of more lifelike images to represent targets--would enhance evaluation of a tactical situation display, i.e., enable the user to more rapidly assimilate and evaluate a tactical situation display. Basis for comparison was the Navy Tactical Display System (NTDS). Specifically, experiments used in our research included comparisons of monochromatic NTDS, color figurative symbology.

The analysis of the data obtained from the experiments suggests color symbology is significantly better than monochromatic symbology and figurative is better than NTDS symbology. Specifically, color figurative (green/red) was best, followed in order by, color figurative (blue/orange), color NTDS, then monochromatic NTDS.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: R. F. Richards
Department of
Operations Research

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN VOICE
RECOGNITION SYSTEMS IN MICROCOMPUTERS

Frank Sal Calcaterra
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

This research investigates the use of inexpensive voice recognition systems hosted by microcomputers. The specific intent was to demonstrate a measurable and statistically significant improvement in the performance of relatively unsophisticated voice recognizers through the application of artificial intelligence algorithms to the recognition software. Two different artificial intelligence algorithms were studied, each with differing levels of sophistication.

Results showed that artificial intelligence can increase recognizer system reliability. The degree of improvement in correct recognition percentage varied with the amount of sophistication in the artificial intelligence algorithm.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: G. K. Poock
Department of
Operations Research

A COMMUNICATIONS PROCESSOR FOR
C3 ANALYSIS AND GAMING

Lloyd Neil Clark
Captain, United States Air Force
B.S., Ohio State University, 1975
M.A., Webster College, 1978

Larry Douglas Pless
Captain, United States Air Force
B.S., University of Missouri, 1970

Robert Lee Rapp
Major, United States Air Force
B.S., University of Louisville, 1967
M.S., University of Southern California, 1979

This thesis developed the software capability to allow the investigation of C3 problems, procedures and methodologies. The resultant communication model, while independent of a specific wargame, is currently implemented in conjunction with the McClintic Theater Model (MTM). It provides a computerized message handling system (C3 Model) which allows simulation of communication links (circuits) with user-definable delays; garble and loss rates; and multiple circuit types, addressees, and levels of command and control problems in the areas of organizational relationships, communication networks and procedures, and combat doctrine or tactics.

Master of Science in
Systems Technology (C3)
March, 1982

Advisor: S. H. Parry
Department of
Operations Research

A COMPUTER PROGRAM FOR INVESTIGATING ATMOSPHERIC
EFFECTS ON LASER DESIGNATORS

Scott R. Crager
Lieutenant, United States Navy
B.A., Jacksonville University, 1975

This thesis presents a computer program designed to analyze the data from a TV camera for investigating laser beam propagation through the atmosphere. It used aspects of Fourier optical theory to analyze the TV image to measure the effects of atmospheric disturbance and platform stability on the target spot. The understanding and analysis of these effects are increasingly important as lasers and other optical devices experience increased use in military applications.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: E. A. Milne
Department of
Physics

AN INPUT/OUTPUT FILTER PROGRAM FOR THE
WARFARE ENVIRONMENT SIMULATOR (WES)

Peter William Fotheringham
Captain, United States Army
B.S., United States Military Academy, 1973

This thesis describes the concept of an input and output filter for the Warfare Environment Simulator (WES). The filter is comprised of two computer programs which were written in the "C" programming language. The main program examines the input to the filter on a character by character basis, and provides two basic capabilities which are not currently available in WES. The first is the ability to edit or create files, and the second is a facility for translating abbreviations (macros) into WES commands. The macros may include values which are substituted into variables in the commands as they are sent to WES. The second program buffers the output from WES as directed by the main program to avoid an interleaving of output when a process other than WES is in use.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: J. M. Wozencraft
Department of
Electrical Engineering

AN INVESTIGATION OF THE DYNAMIC MODEL
OF MODERN MILITARY CONFLICT

Timothy William Fox
Major, United States Air Force
B.S., Bowling Green State University, 1969
A.M., University of Northern Colorado, 1977

The Dynamic Model of Modern Military Conflict developed by Dr. Paul Moose, Naval Postgraduate School, is described by its system of differential equations followed by an investigation of its behavior. This investigation is predicated by an analysis of the model's stability about equilibrium using a method attributed to the study of ecosystems. The basis for this analysis is the formulation and subsequent evaluation of a community matrix termed the conflict matrix for this investigation.

Specific investigation of the model's behavior is observed varying the Command, Control, Communications and Intelligence (C³I) enhancements of one combat force against that of an opposing force while one force utilizes misinformation and deception as a counter C³ tactic and the other uses physical destruction as a counter C³ tactic.

Potential military use of this model as an analytical tool for playing "what if?" type wargames is envisioned following further research and study of the effects on model behavior by varying other parameters not specifically addressed in this initial investigation.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: P. H. Moose
Department of
Electrical Engineering

AN INVESTIGATION OF A LAND COMBAT TACTICAL
COMMANDER'S DECISION-MAKING PROCESS

Scott Kevin Johnson
Captain, United States Army
B.S., United States Military Academy, 1975

An investigation was made of how two different experimental tools could be used to investigate an Army tactical commander's decision-making process. The procedure was to use a single decision; the Army battalion/task force commander's decision to mass supporting artillery on a trigger area/kill zone, and investigate the variables that affect the decision. The experimental tools used were a questionnaire, in which an experiment on this decision was completed, and the interactive computer wargame, JANUS, which was described and investigated for its usefulness in analyzing tactical decisions.

Master of Science in
Systems Technology (C3)
October 1982

Advisors: S. H. Parry
Department of
Operations Research

M. G. Sovereign
Department of
Operations Research and
C3 Academic Group

THE SUSCEPTIBILITY OF JINTACCS MESSAGES TO JAMMING

Steven M. Keller
Captain, United States Air Force
B.S., University of Washington, 1970
M.B.A., University of Utah, 1977

The JINTACCS program was established to insure the interoperability of tactical command and control systems used in joint military operations. One of the standards JINTACCS has developed is a message format to enhance the exchange of written information within the joint task force. This research investigated the susceptibility of the JINTACCS message formats used in air operations to jamming. The susceptibility was measured by comparing the percent of understandability of JINTACCS messages to all plain text non-formatted messages after each had been subjected to equal levels of electronic jamming. Continuous and burst jamming were modeled for this experiment. The experimental results revealed no statistically significant differences in the percent of understandability between the JINTACCS messages and the plain text messages. Curves of understandability were established from the experimental results for different levels of continuous jamming and different levels of continuous jamming and different levels of burst jamming.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: F. R. Richards
Department of
Operations Research

AN INVESTIGATION OF THE APPLICATION OF VOICE
INPUT/OUTPUT TECHNOLOGY IN THE
COINS NETWORK CONTROL CENTER

Thomas Raphael Malarkey
B.A., Pennsylvania State University, 1963

During the 1980s we will continue to see an increased use of distributed computer networks. Although network usage has been found to be effective in a wide variety of applications, continued network expansion heightens the need for effective management to achieve optimum performance, reliability, and security of network operations. Advances in network management have not kept pace with the problems that arise in network operation. The Community On-Line Intelligence System (COINS) is a packet-switched network connecting organizations in The U.S. intelligence community. COINS exhibits many of the difficulties faced by large networks. It is ironic that networks have made advanced technology available to a large number of users, yet the use of advanced technology to assist network management has been relatively limited. This thesis will study the COINS Network Control Center (CNCC) and explore ways that Voice Input/Output (VIO) Technology can be used to improve the day-to-day management of network operations.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: G. K. Poock
Department of
Operations Research

ANALYSIS OF THE RELIABLE STING
EARLY WARNING SYSTEM

Robert John Reese
Captain, United States Army
B.S., United States Military Academy, 1974

The U.S. Army is attempting to standardize short-range air defense command and control procedures. The Reliable STING Early Warning System has been selected as one of the models for this standardization. This thesis analyzes the Reliable STING concept to determine the degree to which it satisfies the users' requirements for air defense command and control information and to determine potential enhancements to increase the effectiveness of its early warning capabilities. Analysis is based upon an identification of the users and a determination of their air defense information requirements. The system's ability to apply the potential value of information resources to satisfy these needs is the measure of its effectiveness. Proposed alternatives are directed at providing near-term, low-risk solutions to identified deficiencies.

Master of Science in
Systems Technology (C3)
March 1982

Advisors: S. A. Parry
MAJ J. E. Ellis
Department of
Operations Research

INVESTIGATION INTO AIR LAUNCH CRUISE MISSILE (ALCM)
FLIGHT INFORMATION LOADING & DISPLAY TECHNIQUES
DURING FLEX TARGETING PROCEDURE

John Charles Ruess
Captain, United States Air Force
B.S., Loyola University of Los Angeles, 1974

This thesis compared the use of a discrete utterance voice recognition system and a keyboard entry device in retargeting Air Launch Cruise Missiles (ALCM) prior to launch from a B-52G aircraft. Time to load, input and output accuracies, and time versus accuracy measurements were made for each of twenty subjects. Keyboard entry was found to be better than voice entry in time to load and input accuracy. These findings are limited to discrete utterance voice recognition systems and most probably would have been different if a connected speech recognition system had been utilized.

Also investigated were three display formats for presenting flex targeting information on a cathode ray tube. Information was updated on the cathode ray tube using single-space, double-space, and inverse-video formats. Time to update, input and output accuracies, and time versus accuracy measurements were recorded. No significant differences were found among the three display formats.

Master of Science in
Systems Technology (C3)
March 1982

Advisor: W. Moroney
Department of
Operations Research

MASTER OF SCIENCE
IN
SYSTEMS TECHNOLOGY
ELECTRONIC WARFARE (EW)

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POSITIONING OF JAMMING AIRCRAFT USING THE INTEGRATED
REFRACTIVE EFFECTS PREDICTION SYSTEM

Thomas W. White
Captain, United States Air Force
B.S., New Mexico State University, 1971

Tactical EMC planning has historically considered only horizontal positioning of self-protection and standoff jamming systems. Failure to consider vertical positioning of the jammer, and how the environment affects that positioning, can lead to substantially reduced jamming effectiveness. The effects of radar and jamming system antenna patterns and environmental considerations are discussed. The Integrated Refractive Effects Prediction System (IREPS) incorporates these effects, but not in a form that is convenient for ECM planning. However, as it is now configured, IREPS can be a useful tool. A step-by-step approach for using IREPS and the jamming equations to assist the ECM planner is given. Sample calculations for self-protection and standoff jamming under actual environmental conditions are provided.

Master of Science in
Systems Technology (EW)
October 1982

Advisor: G. E. Schacher
Department of
Physics

PREVIOUS PAGE
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MASTER OF SCIENCE

IN

**TELECOMMUNICATIONS
SYSTEMS
MANAGEMENT**

IMPROVING THE ELECTRONIC CAPABILITIES IN THE FLEET

Nancy E. Brown
Lieutenant, United States Navy
B.S., Stephens College, 1973

Maintenance in the U.S. Navy is officially prescribed to be accomplished by a three-tiered approach: organizational level (ship's force), intermediate level (tenders and shore-based intermediate maintenance activities--SIMAs), and depot level (shipyards). This thesis examines current trends in the utilization of these levels for maintenance of electronic equipment. The major objective was to determine the impact on manpower, training and supply support that an increase in the organizational level's responsibilities would have. An extensive research effort considered all available printed material relating to the maintenance systems currently in use. Interviews with maintenance managers at all levels of command were conducted at U.S. Navy maintenance facilities at Pearl Harbor, Hawaii, San Diego, California, and Norfolk, Virginia. These interviews addressed general maintenance topics as well as specifics on eight pieces of electronic equipment. The major conclusion of this effort is that given adequate training, proper tools and increased supply support the organizational level's capabilities are constrained only by the physical limitations of its vessel.

Master of Science in
Telecommunications Systems
Management
March 1982

Advisor: A. W. McMasters
Department of
Administrative Sciences

APPLICATION OF SELECTED SOFTWARE COST ESTIMATING MODELS
TO A TACTICAL COMMUNICATIONS SWITCHING SYSTEM:
TENTATIVE ANALYSIS OF MODEL APPLICABILITY
TO AN ONGOING DEVELOPMENT PROGRAM

William B. Collins
Major, United States Marine Corps
B.S., United States Naval Academy, 1971

This study analyzes the applicability of software cost estimating models to a tactical information processing system. In particular, the Boehm and Putnam models are used to obtain predictions which are compared to contractor estimates for the TRI-TAC AN/TTC-42 Unit Level Circuit Switch. Factors affecting model performance are also examined. Conclusions address the requirement for more accurate estimation of software project scope and clarification of model input parameter definitions.

Master of Science in
Telecommunications Systems
Management
March 1982

Advisor: D. C. Boger
Department of
Administrative Sciences

LESSONS LEARNED IN COMMUNICATIONS SERVICES CONTRACTING

Lillain Elaine Fishburne
Lieutenant Commander, United States Navy
B.A., Lincoln University, 1971

The United States Navy is currently utilizing communications services contracting at Naval Radio Transmitter Facilities and Naval Radio Receiver Facilities to alleviate problems of manpower and budgetary constraints. This thesis examines the problems that hindered communications services contracting and the administration of these contracts and the lessons learned thus far in relying upon the private sector for communications services at these facilities. The major problems appear to be a general misunderstanding of contracting for services, as opposed to materials, and, specific to these communications service contracts, poorly written statements of work and inadequate quality assurance plans.

Master of Science in
Telecommunications Systems
Management
June 1982

Advisor: D. C. Boger
Department of
Administrative Sciences

ACQUISITION OF TELECOMMUNICATIONS IN THE NAVY FROM AN
AUTOMATIC DATA PROCESSING (ADP) POINT OF VIEW

Ann Margaret Sheedy
Lieutenant, United States Navy
B.A., University of Texas, 1977

This thesis effort is a study of telecommunications acquisition in the Navy from an Automatic Data Processing (ADP) point of view. From their perspective, the ADP community wants to see improvements made to telecommunications acquisition in order to benefit themselves and the communications community. The principal elements of the study concern the current management environment of telecommunications and ADP according to guidance provided in directives and instructions. The specific areas which receive attention are policy, levels of requirements/AIS, dollar/approval thresholds, procedures/schedule for submitting plans, submitting authority, validation authority, and approval authority. Finally, the study reviews and evaluates telecommunications acquisition, focusing on problems and their causes as seen by the ADP community. Recommendations for solutions to the problems are provided.

Master of Science in
Telecommunications Systems
Management
March 1982

Advisor: N. R. Lyons
Department of
Administrative Sciences

A COMMUNICATIONS TRAFFIC FLOW SIMULATION MODEL OF THE
MESSAGE SWITCHING SYSTEMS

Steven P. Wolf
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1976

A traffic flow model is designed using the General Purpose Simulation System (GPSS V) for the U.S. Coast Guard Communications Station San Francisco. The architecture of the proposed Message Switching System (MSS) is used to analyze the flow of message traffic in the new system. This model indicates that the MSS can adequately handle traffic loads which are currently occurring or are foreseen to occur at this COMMSTA.

Master of Science in
Telecommunications Systems
Management
October 1982

Advisor: D. C. Boger
Department of
Administrative Sciences

MASTER OF ARTS

IN

**NATIONAL
SECURITY
AFFAIRS**

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RESIDENTS OF LUBYANKA: A STUDY OF THE SOVIET
COMMITTEE FOR STATE SECURITY, THE KGB

Richard Edward Barthelemy
Captain, United States Army
B.A., University of Minnesota, 1974

Since the successful 1917 Bolshevik Revolution, the KGB has acted as a powerful weapon at the disposal of Soviet leaders. The KGB and its predecessors have successfully frustrated would-be opponents of Soviet dictatorial rule both within the U.S.S.R. and the Warsaw Pact. The KGB has mounted a successful intelligence gathering effort which significantly enhances the technological development of Soviet weapons manufacturers and provides Soviet decisionmakers with important strategies of potential enemies in both the diplomatic and military fields. This thesis examines the KGB through a threefold process. An historical study traces the evolution of the KGB from a secret police organization to a bureaucracy responsible for both secret police operations and intelligence collection capabilities. A study of the present organization and activities of the KGB outlines current assets and liabilities of the KGB and the role of the KGB in the Soviet decisionmaking process. A comparative study of the KGB during a crisis situation outlines the organization's involvement in the Czechoslovak crisis of 1968 and the Hungarian crisis of 1956, and develops a pattern for KGB involvement in a future comparable situation. Finally, a list of suggested countermeasures to KGB operations is proposed for the consideration of U.S. counterintelligence organizations.

Master of Arts in
National Security Affairs
December 1981

Advisor: J. Valenta
Department of
National Security Affairs

UNITED STATES POLICY OPTIONS IN THE
WESTERN INDIAN OCEAN

Michael F. Cordasco, Jr.
Lieutenant Commander, United States Navy
B.S., Texas A&M University, 1970

This thesis examines United States interests in the Western Indian Ocean and recommends a policy toward the area. It analyzes the economic and regional importance of the main states in the area: Madagascar, Mozambique, Mauritius, The Comoros, and the Seychelles. Particular attention is given to strategic, economic and political considerations. United States policy objectives and options in the area are broadly explored and recommendations are made for a policy that is affirmative rather than reactive in approach to the area and its problems. This approach should not target a specific country but rather must look at the area in a regional and global perspective.

Master of Arts in
National Security Affairs
June 1982

Advisor: M. C. Clough
Department of
National Security Affairs

THE NEW BRITISH DETERRENT: STRATEGIC PLANNING AND
DOMESTIC POLITICAL IMPLICATIONS

Kevin P. Cummings
Lieutenant Commander, United States Navy
B.A., University of Notre Dame, 1969

The British Government announced its intention in July 1980 to modernize its strategic nuclear deterrent with the deployment of the Trident I (C4) submarine-launched ballistic missile. The MIRVed Trident missile will have significantly increased capabilities of range, payload and target numbers. It also represents an enormous expense for the British to bear and high political and military opportunity-costs for capabilities which may not be vital to an effective and credible national strategic deterrent. The political difficulties likely to be encountered in bringing the Trident program to fruition may portend the loss of all British strategic capability, while resulting conventional weapons reductions may even contribute to lowering the threshold of aggression in Western Europe and increasing the likelihood of the threatening circumstances a nuclear deterrent is designed to avoid. Alternative strategic options, such as Polaris or Poseidon SLMBs or cruise missiles, should be explored to achieve the strategic stability and guarantee which the British seek.

Master of Arts in
National Security Affairs
October 1982

Advisor: D. S. Yost
Department of
National Security Affairs

THE GAUNTLET CAST: POLAND CHALLENGES THE SOVIET UNION

Karl Gustav Grunwald
Captain, United States Army
B.S., United States Military Academy, 1976

Since the Soviet Union entered Eastern Europe in 1944, each twelve year period has been punctuated by a serious challenge to their continued control and has been responded to with a Soviet military intervention. The events in Poland which erupted in August, 1980, provide the most recent example. This study, which cannot be all-inclusive because of information difficulties and the currency of the situation, addresses;

- 1) what is currently happening in Poland;
- 2) how these events challenge the Soviet Union;
- 3) how the Soviets have reacted to the events thus far; and
- 4) the prospects of Soviet military intervention in the future.

Master of Arts in
National Security Affairs
June 1981

Advisor: J. Valenta
Department of
National Security Affairs

DEMOGRAPHICS, ECONOMICS, AND THE SOVIET ARMED FORCES:
IMPLICATIONS FOR U.S. NATIONAL SECURITY POLICY

Neil F. Hasson
Captain, United States Army
B.S., United States Military Academy, 1976
M.B.A., Pepperdine University, 1979

This thesis examines the economic, political, and military implication of rapidly changing demographic trends in the Soviet Union, with particular emphasis upon manpower issues. The analysis offers a number of forecasts concerning the likely direction of future military and economic policy in the training and utilization of Soviet manpower resources. The hypothesis offered is that demographic variables will act to reduce the quality, effectiveness, reliability, and motivation of the Soviet Armed Forces. Although reductions in the size of the military force are not forecasted, demographic realities will impose formidable constraints upon any attempts at force expansion for the remainder of the century. The paper concludes with a brief discussion of national security considerations for both the U.S. and the U.S.S.R.

Master of Arts in
National Security Affairs
December 1981

Advisor: J. Valenta
Department of
National Security Affairs

THE US AND THE FRG IN THE THIRD WORLD

Michael Kelly Hopkins
Major, United States Army
B.A., Texas A&M University, 1974

German-American relations in the Third World constitute a vital concern to the entire international community and represent a particularly important subject for American policymakers at this time. Over the past three decades, the FRG has developed into one of the most important and stable allies of the United States. However, during the same period the FRG, once little more than a protectorate of the US, has become a medium-sized power, showing great economic strength and growing independence in pursuit of its national interest. Though the FRG's interests continue to strongly link it to the Western alliance, its increased economic strength, growing independence in international relations, and a more complex international environment make differences of opinion between Germany and America more likely. Today German-American relations and foreign policy toward the Third World are complementary. However, there are differences and potential conflicts. This study examines the Third World policies of the FRG and the US in an attempt to determine whether or not they are likely to be a cause of conflict or cooperation in future German-American relations.

Master of Arts in
National Security Affairs
June 1982

Advisor: M. W. Clough
Department of
National Security Affairs

SPAIN AT EUROPE'S CROSSROADS: PROSPECTS FOR SPANISH INTEGRATION
TO THE NORTH ATLANTIC TREATY ORGANIZATION
AND THE EUROPEAN ECONOMIC COMMUNITY

Shannon Theresa Keenan
Lieutenant, United States Navy
B.S., School of Foreign Service Georgetown University, 1972

This thesis examines the implications of Spain's integration into Western Europe through membership in the North Atlantic Treaty Organization (NATO) and the European Economic Community (EEC). The EEC is discussed to provide background for analysis of key issues pertaining to Spanish membership. The ramifications of future NATO membership, given Spain's strategic importance in the Mediterranean, are considered. From a Spanish perspective, the thesis concentrates on the countervailing political and economic factors involved with Spanish integration into the EEC and NATO. United States national interests in Spain are explored in light of probable changes as Spain joins Western Europe. Spain's integrative process illustrates the relationship between Spanish national security goals and Spanish economic development goals. As Spain attains these goals, the need to depend on the U.S. for security protection may diminish. A more independent European role for Spain can be expected as its nascent democracy matures.

Master of Arts in
National Security Affairs
March 1982

Advisor: D. S. Yost
Department of
National Security Affairs

THE NATO ALLIANCE: US CONVENTIONAL FORCE LEVEL OPTIONS
TOWARD IT BASED ON US NATIONAL INTERESTS

Daniel George Krynovich
Captain, United States Army
B.S., University of Wyoming, 1971

NATO has proven itself to be a most stable and successful organization for peace. However, the world today is far different from when the alliance was formed thirty-two years ago, and many relationships have changed. As Western Europe has developed from World War II, it has attained a large measure of economic and political stability. It has evolved into a major power center. The US, meanwhile, has seen a decline in its ability to defend its changing national interests. Therefore, the central objective of this thesis is to analyze the relationships between NATO and Western Europe and relate those findings to an assessment of current US national interests. The thesis will propose four US conventional force level options toward NATO in the 1980's and will conclude with the recommended implementation of one of the four options. The ultimate question asked by this thesis is: "Could the US better insure militarily the defensibility of its current overall national interests by redefining its current role in NATO?"

Master of Arts in
National Security Affairs
September 1981

Advisor: F. M. Teti
Department of
National Security Affairs

FRANCE, WEST GERMANY, AND THE SECURITY OF THE PERSIAN GULF

David L. Leonard
Lieutenant, United States Navy
B.S., The Pennsylvania State University, 1974

The series of events which began with the Arab oil embargo in 1973 and recently culminated in the Iranian Revolution, the Soviet invasion of Afghanistan, and the Iran-Iraq Conflict, have underscored the vulnerability of Western oil supplies from the Persian Gulf region. This research analyzes the potential role of France and West Germany as U.S. allies in relation to the problem of ensuring the security of the Persian Gulf while maintaining the credibility of deterrence in Europe. Included in this analysis are assessments of French and West German dependence on Persian Gulf oil supplies and an evaluation of each country's capability and intention to contribute to the security of the region. The conclusion reached is that neither country in the near-term has a viable alternative to political and military efforts to protect their energy security. Moreover, each country possesses unique capabilities to complement U.S. efforts in this area, but the policy of France conforms more to American policy than that of the traditionally staunch supporter of U.S. policies, West Germany.

Master of Arts in
National Security Affairs
March 1982

Advisor: D. S. Yost
Department of
National Security Affairs

AN ESTIMATE OF SOME STRENGTHS AND WEAKNESSES OF
THE SOVIET NAVAL OFFICER THAT COULD AFFECT
HIS PERFORMANCE IN FUTURE COMBAT

Robert William Maggi
Lieutenant Commander, United States Navy
B.A. Fairfield University, 1970

The purpose of this thesis is to provide information that will assist in estimating the strengths and weaknesses of the Soviet naval officer in future combat. This will be accomplished by: (1) examining the observations of senior German military officers, who fought the Soviets in World War II, on the strengths and weaknesses of the Soviet's fighting qualities during that conflict, and (2) examining the qualities that are considered by the Soviet Navy today as being necessary for victory in future combat.

The results of these two examinations will be compared so as to provide some insight into the fighting qualities that could be expected from the Soviet naval officer in combat. This information when used in conjunction with intelligence data will assist in estimating the strengths and weaknesses of Soviet naval officers in future combat.

Master of Arts in
National Security Affairs
June 1982

Advisor: D. C. Daniel
Department of
National Security Affairs

EFFECTS OF MILITARY DEVELOPMENT ON ECONOMIC GROWTH
IN NORTH AND SOUTH KOREA, 1945-1980

George T. Marenic
Captain, United States Air Force
B.S., Baptist College at Charleston, 1974

Since the end of the Korean War, both Koreas have maintained their military forces in a high state of readiness. Until recently, the strategic environment on the Korean Peninsula was largely determined by the quantity and quality of arms supplied by major allies. Since the late 1960's, however, both North and South Korea have pursued policies to develop their own indigenous arms industries, expanded their defense budgets, and implemented military modernization programs.

It is the hypothesis of this thesis that North Korea is more adversely affected by defense spending than South Korea. Although North and South Korea have structurally different economic systems, the same set of financial constraints apply for each. By paralleling military development and economic growth patterns for both North and South Korea, evidence of different effects of defense spending on economic growth of the two countries can be determined. These findings will then be used to project the prospects for peace and stability in the Korean Peninsula in the 1980's.

Master of Arts in
National Security Affairs
December 1981

Advisor: E. A. Olsen
Department of
National Security Affairs

SOVIET-INDIAN RELATIONS AND THE INDIAN
OCEAN AS A ZONE OF PEACE

Thomas McClintock Price
Lieutenant, United States Navy
A.B., Duke University, 1975

On 16 December 1971, the United Nations General Assembly adopted Resolution 2832 (XXVI) declaring the Indian Ocean, within limits to be determined, together with its air space and sea bed, to be a zone of peace. The resolution also called upon the Great Powers to enter into negotiations with the littoral states of the region to halt any further escalation of their military presence and to eliminate all bases and other Great Power competition. This paper examines the history of the zone of peace process as it relates to the interests of three states: the United States, the Soviet Union, and India. Particular attention is devoted to the Soviet and Indian positions, and how each nation's regional interests have led to divergent views on the topic. The work concludes that previous attempts to make the Indian Ocean into a zone of peace have concentrated on drafting international resolutions and reducing naval arms, while ignoring the central problem of competing national interests. Confidence-building measures related to these interests would be a better approach, now that naval arms reduction talks are deadlocked.

Master of Arts in
National Security Affairs
December 1981

Advisors: C. A. Buss
B. F. Huff
Department of
National Security Affairs

INFLUENCE: U.S. NATIONAL INTEREST AND THE
REPUBLIC OF THE PHILIPPINES

Joseph Christopher Menendez
Captain, United States Air Force
B.A., Trenton State College, 1970
M.S., State University of New York, Binghamton, 1980

This study attempts to reconcile the concept of the national interest with the problem of foreign policy formulation, using the Philippines as its central focus. The basic premise is that foreign policy should be concerned with the "ability" to achieve the national interest rather than with any strict definition of the national interest itself.

The study finds that the national interest is actually an undefinable set of needs and values, and suggests that policy should be based on influence as the means whereby a nation achieves this undefinable value system. It then analyzes influence on a conceptual level and finds that three dimensions (economic, military and political/ideological) determine a nation's level of influence in the international system.

These dimensions are then examined to verify the need for U.S. influence in Southeast Asia and to show how U.S./Philippine relations contribute to regional influence. The Philippine domestic environment is examined to determine U.S. policy objectives which will promote U.S. influence in the Philippines.

Master of Arts in
National Security Affairs
December 1981

Advisor: C. A. Buss
Department of
National Security Affairs

SOVIET FOREIGN POLICY TOWARDS GREECE AND TURKEY:
CONTRAST WITHIN COHERENCE

Albert Clinton Myers
Lieutenant Commander, United States Navy
B.S., Yale University 1970

This thesis analyzes the evolution of post-1945 Soviet foreign policy towards Greece and Turkey. The Soviet Union has sought to impair and eliminate Greek and Turkish security ties to NATO and to the United States. Key political, diplomatic, economic, and propagandistic events in Soviet-Greek and Soviet-Turkish relations suggest patterns of Soviet objectives and successes in each country.

The Soviet Union has pursued unobtrusive approaches towards Greece, while making more concerted efforts through diplomatic, economic, and perhaps clandestine means to increase Soviet influence in Turkey. In 1978-1979, Turkey's foreign policy seemed to be moderately influenced by Soviet preferences, while a new situation has existed since 1980. The anti-American orientation of Andreas Papandreou's government may offer unprecedented opportunities to Soviet diplomacy in Greece. U.S. blunders made on an ad hoc short-term basis, with respect to the national sensitivities of both countries have facilitated the successes of Soviet foreign policy. The Greek and Turkish cases suggest that the Soviets have profited from U.S. errors in their implementation of a long-term and consistent policy to reduce U.S. influence in Western Europe.

Master of Arts in
National Security Affairs
June 1982

Advisor: D. S. Yost
Department of
National Security Affairs

ZIMBABWEAN NATIONALISM AND THE RISE OF ROBERT MUGABE

Mark Francis Riley
Captain, United States Army
B.A., University of California, Santa Barbara, 1975

This thesis discusses the black nationalist movement in Zimbabwe. The first part is a history of the Zimbabwean nationalist movement, including the emergence and evolution of the nationalist organizations and leaders, the guerrilla war, and the diplomatic negotiations that occurred up to the Lancaster House Settlement of 1979. The second portion explains why and how Robert Mugabe and the Zimbabwe African National Union won the 1980 elections. The author compares Mugabe with his two principle opponents, Joshua Nkomo and Bishop Abel Muzorewa. The personal backgrounds, political careers, leadership abilities, and bases of support of the three candidates are examined and analyzed. The author concludes that Mugabe's personal reputation and credibility enabled him to win the loyalty of the majority of the guerrillas who in turn mobilized a large popular base of support for him.

Master of Arts in
National Security Affairs
June 1982

Advisor: M. W. Clough
Department of
National Security Affairs

JAPAN RESOURCE DEPENDENCE

Richard William Sim
Lieutenant Commander, United States Navy
B.A., University of Texas, 1968

This thesis is an examination of Japan's strategic resource dependence and her reliance of the three raw materials-rich regions of Southeast Asia (ASEAN), the Persian Gulf, and Southern Africa. A discussion of the Japanese formula for securing resources in the less developed countries of the "South" is included along with a brief overview of her onshore resource utilization in business/industry. The roles of direct foreign investment, official development assistance, energy conservation, and Japanese multinationalization are discussed.

Each resource supplying region is examined and supported with current tables and figures concerning bilateral/multilateral relations with Japan, emphasizing the post-1973 timeframe. The Nuechterlein national interest matrix is applied to Japan's resource dependence and analyzed with postulated scenarios. A brief assessment of Japan's current economic position is included along with the concluding remarks.

Master of Arts in
National Security Affairs
March 1982

Advisor: C. A. Buss
Department of
National Security Affairs

THE PHANTOM FLEET--FOREIGN FLAGS ON U.S. SHIPS

Douglas Vaughn Smith
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

This thesis is an analysis of United States tankship assets and the ability to transport oil resources, particularly in a crisis situation. It examines the question of whether tankship assets are sufficient to meet national demands for oil imports and, through quantitative analysis using multiple regression techniques, makes projections for continued sufficiency of tankship assets through the year 2000. The research effort was primarily directed at the development of U.S. merchant marine policy as that policy provides structure for current merchant marine assets. Three distinct groupings of vessels are considered: (1) those owned and/or operated by the Military Sealift Command; (2) those registered in the United States and flying the U.S. flag; and (3) those owned by U.S. citizens but registered abroad and comprising the "effective U.S. controlled fleet."

Master of Arts in
National Security Affairs
June 1982

Advisor: R. E. Looney
Department of
National Security Affairs

THE INTERNATIONAL POLITICS OF SPANISH ACCESSION TO NATO

Edward McKim Sniffin
Lieutenant Commander, United States Navy
B.B.A., University of Wisconsin, 1969

This thesis examines four important international bilateral relationships which were significant during the process of Spanish Accession to NATO, focusing on one particular issue in each of the four relationships. The relationships and issues examined are:

1. Spain and the Soviet Union, with emphasis on Soviet attempts to hinder the process of accession.
2. Spain and Britain, and the question of Gibraltar.
3. Spain and Portugal, and the prospective restructuring of the NATO military command.
4. Spain and the Federal Republic of Germany, stressing NATO strategy for the defense of the Central Front.

The thesis discusses the interaction of interests in each relationship, and the effects of each issue on the accession process. Conclusions are drawn regarding the probable resolution of each issue if Spain is fully integrated into NATO, and possible implications of each relationship for long term alliance cohesion are discussed.

Master of Arts in
National Security Affairs
March 1982

Advisor: D. S. Yost
Department of
National Security Affairs

THE GERMAN REUNIFICATION ISSUE: A SOVIET PERSPECTIVE

Lynette Manning Tatsch
Captain, United States Air Force
B.A., Purdue University, 1971

The question of German reunification has endured over time, conflict and the convulsions of global power. After thirty years, the Germans are still pondering over the rent in their nation's boundries and debating whether the present schism is immutable or will be reversed sometime in the future. However, the reunification issue is indeed significant beyond the scope of German cohesion-- it imports directly on international security and lies at the nexus of superpower relations. The present agitation in Poland may be the impetus for the revival of the reunification chant. This research provides an analysis of German reunification with an emphasis on the Soviet perspective. I will examine the issue by: reviewing the history of reunification negotiations from 1947-- present: exploring the advances gained by OSTPOLITIK/WESTPOLITIK; studying the sentiments of the East European countries on the reunification issue; discussing the inextricable linkage of the problem to the interdependence in economic relations between the Federal Republic of Germany, the German Democratic Republic, and the Soviet Union; and conclude by presaging the prospects for the ultimate realization of reunification.

Master of Arts in
National Security Affairs
September 1981

Advisor: J. Valenta
Department of
National Security Affairs

THE NORTHERN TERRITORIES: CASE STUDY
IN JAPANESE-SOVIET RELATIONS

Michael A. Thompson
Captain, United States Army
B.B.A., Texas A&M University, 1972

Japanese-Soviet relations have historically been, as they are today, characterized by distrust and dislike for each other. One of the manifestations of this antagonistic relationship is the Northern Territories problem - the conflicting claims of Japan and the Soviet Union to a group of four islands in the southern Kuriles.

By presenting a case study of the Northern Territories dispute, this thesis will attempt to illuminate some of the salient differences in the national patterns of Japan and the Soviet Union. It is the hypothesis of this thesis that the Northern Territories problem exists because Japan and the Soviet Union subsist and function in radically different paradigms - disparities in their historical, economic, political, geo-strategic, and philosophical existence.

Master of Arts in
National Security Affairs
June 1982

Advisor: E. A. Olsen
Department of
National Security Affairs

SPAIN: DEMOCRACY AND THE MILITARY

Charles Douglas Voros
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B.A., University of Virginia, 1969

Since the death of Generalissimo Francisco Franco in November 1975, Spain has undergone a remarkable political transformation in which King Juan Carlos I, Franco's handpicked successor, inherited the authoritarian powers of a dictator and promptly used them to turn his country into a constitutional monarchy rooted in liberal democratic principles.

The initial phase of Spain's democratic evolution was characterized by euphoria and good will in which a series of firm and decisive steps were taken to replace the old regime with new democratic institutions and norms. Since 1979, however; the pace of Spain's democratic progress has slowed, as the problems of regional autonomy, terrorism, and a disaffected military have threatened to disrupt Spain's democratic evolution. Prime Minister Suarez' abrupt resignation in January 1981 and the military coup attempt a month later brought into sharp focus the fragile state of Spain's democracy.

The present government has pursued a mixed program of reform and appeasement to defuse the danger of a military takeover in Spain. Elements within the Spanish military, however, remain a potential threat to Spanish democracy.

Master of Arts in
National Security Affairs
December 1981

Advisor: D. P. Burke
Department of
National Security Affairs

MUTINY ON STOROZHEVOY: A CASE STUDY OF
DISSENT IN THE SOVIET NAVY

Gregory D. Young
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B.S., Oregon State University, 1975

In November 1975, a group of sailors led by the ship's political officer took over the Soviet "Krivak" class destroyer "Storozhevoy" and attempted to sail to Sweden to seek asylum. They were attacked and turned back by Soviet naval and air units. Information of this dramatic event, which has never been acknowledged by the Soviets, made it to the West only piece by piece. It was the intent of this study to assemble all available data for critical analysis to determine potential causes and implications.

This mutiny is not the only instance of dissent in the Soviet Navy nor will it be the last. Problems of alcoholism, officer-enlisted relations, food, hazing, habitability, desertion, ethnic friction and unhappiness over constant political indoctrination appear to be widespread.

The key question is: how important are these instances of dissent and how do we incorporate them into a framework for assessing Soviet military capability and performance?

In the past we have overemphasized quantitative aspects of assessing military and naval power. The factors which are less quantifiable such as "fighting spirit", unit cohesion and morale have made a greater difference historically. In the allocation of scarce resources for defense and other national priorities, it is essential to make intuitive estimates of potential enemy capabilities as accurately as possible. In the case

Master of Arts in
National Security Affairs
March 1982

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of the Soviet Navy, even planning for the worst case, it seems defense planners still have overestimated some of their strengths. The Soviet Navy has grown from a coastal defense force to a blue-water fleet capable of greater influence on the seas. They are not, however, "ten feet tall" as is emphasized currently in much of the literature.

ADVISOR INDEX

<u>ADVISOR</u>	<u>PAGE</u>
Andrus, A. -----	273, 287, 292, 302
Badal, D. -----	55, 59, 61, 67, 70
Ball, R. E. -----	36, 90
Bank, M. H. -----	18, 37
Blondin, P. W. -----	175, 178
Bobulinski, R. A., LCDR -----	108, 128, 136, 140, 146, 154, 157 163, 164, 170, 185, 197, 204,
Boger, D. C. -----	103, 104, 109, 114, 132, 147, 162 184, 189, 203, 300, 348, 349, 351
Boone, D. H. -----	225
Bromiley, P. -----	144
Brown, G. G. -----	267, 274, 284
Burke, D. P. -----	375
Buskirk, F. R. -----	311, 312, 313
Buss, C. A. -----	366, 367, 370
Cantin, G. -----	29, 228, 231, 233
Challenger, K. D. -----	96, 215, 224
Clough, M. C. -----	356, 360, 369
Collins, D. J. -----	80, 94
Cooper, A. W. -----	315
Coppens, A. B. -----	325
Cox, L. A. Jr. -----	104

Creighton, J. W. -----	119, 124, 127, 130, 137 143, 145, 146, 149, 158 164, 167, 173, 177, 190 191, 196, 199, 202, 205
Crittenden, E. C. -----	11, 314
Culbreth, W. G. -----	232
Cullin, W. H. -----	150, 200
Daniel, D. C. -----	364
Davidson, K. L. -----	253, 321
Ellis, J. L., MAJ -----	162, 277, 338
Elsberry, R. L. -----	243, 254, 255, 258
Elster, R. S. -----	129, 131, 133, 161 165, 174, 181, 194
Esary, J. D. -----	49, 135, 272, 279, 293
Euske, K. E. -----	122, 144, 154
Forrest, R. N. -----	324
Franke, R. -----	50
Fremgen, J. M. -----	121, 123, 188
Fuhs, A. E. -----	34, 38, 44, 88, 92, 93
Garwood, R. W. -----	250, 251
Gaver, D. P. -----	271, 278
Gebhart, B. -----	28
Haderlie, E. C. -----	249, 261
Haltiner, G. J. -----	7
Hamming, R. W. -----	3
Haney, R. L. -----	245
Harris, R. T. -----	148, 192

Hartman, J. K. -----	268, 276, 286, 289, 295
Heinz, O. -----	87, 308, 326
Howard, G. T. -----	299
Huff, B. F. -----	366
Hughes, W. P., Jr. CAPT -----	291
Jayachandran, T. -----	49, 50
Jung, G. H. -----	322
Kalmbach, S. H. -----	317
Kelleher, M. D. -----	28
Kline, M. B. -----	182, 269
Kodres, U. R. -----	62, 64, 71
Larson, H. J. -----	50, 280
Layton, D. M. -----	19, 35, 40, 43, 45, 95, 238
Leath, D. -----	262
Lewis, P. A. W. -----	9, 283
Liao, S. S. -----	125, 156, 159, 186
Lindsey, G. F. -----	294
Looney, R. E. -----	371
Lyons, N. R. -----	55, 63, 99, 102, 103 105, 110, 115, 155, 195, 350
MacLennan, B. J. -----	54, 58
Marshall, K. T. -----	134, 166, 285
Marto, P. J. -----	223, 229
McGonigal, R. A. -----	119, 167, 171, 177, 198
McMasters, A. W. -----	120, 142, 187, 193, 347
McNelley, T. R. -----	209, 234

Milch, P. R. -----	285, 296, 297
Miller, J. A. -----	42, 210
Mills, G. B. -----	264
Milne, E. A. -----	332
Modes, R. W., LCDR -----	100, 109, 114
Moose, P. H. -----	334
Muroney, W. F. -----	91, 290, 339
Myers, G. A. -----	75, 79
Neil, D. E. -----	275, 301, 323
Netzer, D. W. -----	15, 17, 33, 46, 89
Newton, R. E. -----	216
Nickerson, R. G. -----	138, 146, 176
Nunn, R. H. -----	211, 212, 222, 235
Olsen, E. A. -----	365, 374
Paek, S. J. -----	298
Paquette, R. G. -----	256
Parker, S. R. -----	10
Parry, S. H. -----	268, 277, 295 331, 335, 338
Perkins, A. J. -----	227, 236
Platzer, M. F. -----	39
Poock, G. K. -----	330, 337
Pucci, P. F. -----	210, 213, 214
Rahe, G. A. -----	57, 106
Reinhardt, R. A. -----	307

Renard, R. J. -----	252, 257
Richards, F. R. -----	183, 281, 329, 336
Salinas, D. -----	4
Sanders, J. V. -----	84
Sarpkaya, T. -----	237
Schacher, G. E. -----	242, 310, 343
Schneidewind, N. F. -----	53, 65, 66, 68, 100 107, 111, 112
Schoenstadt, A. L. -----	282
Schwirzke, F. -----	309, 316
Senger, J. -----	151, 180
Shreeve, R. P. -----	16, 41
Sladky, J. -----	220, 226, 230
Smith, D. R. -----	56, 69
Sneiderman, L, CDR -----	101, 116, 130, 139, 168, 172
Sovereign, M. G. -----	147, 300, 335
Stilwell, R. R. LCDR -----	60
Stolfi, R. H. S. -----	376
Taylor, C. F. -----	303
Taylor, J. G. -----	288, 298
Teti, F. M. -----	152, 362
Thomas, G. W. -----	126, 160, 169, 201
Thornton, E. B. -----	251
Titus, H. A. -----	77, 78
Traganza, E. D. -----	263
Valenta, J. -----	358, 359

Vanderplaats, G. N. -----	27, 217, 218, 219, 221
Wash, C. H. -----	241, 244
Weissinger - Baylon, R. H. -----	113, 141
Weitzman, R. A. -----	151, 153, 160
Whipple, D. R. -----	126, 175, 179, 270
Wilson, L. A. -----	23
Wilson, O. B. Jr. -----	83
Wozencraft, J. W. -----	8, 76, 333
Yost, D. S. -----	357, 361, 363, 368, 372

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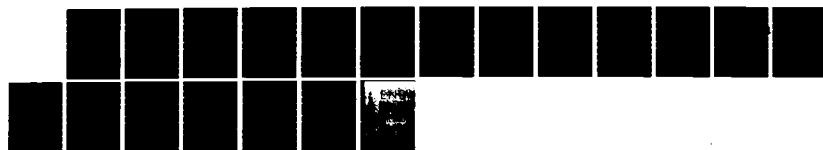
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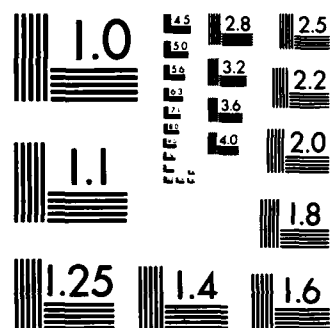
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